#1 Atari Computer Magazine

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Antic

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JANUARY 1985 VOLUME 3, NUMBER 9

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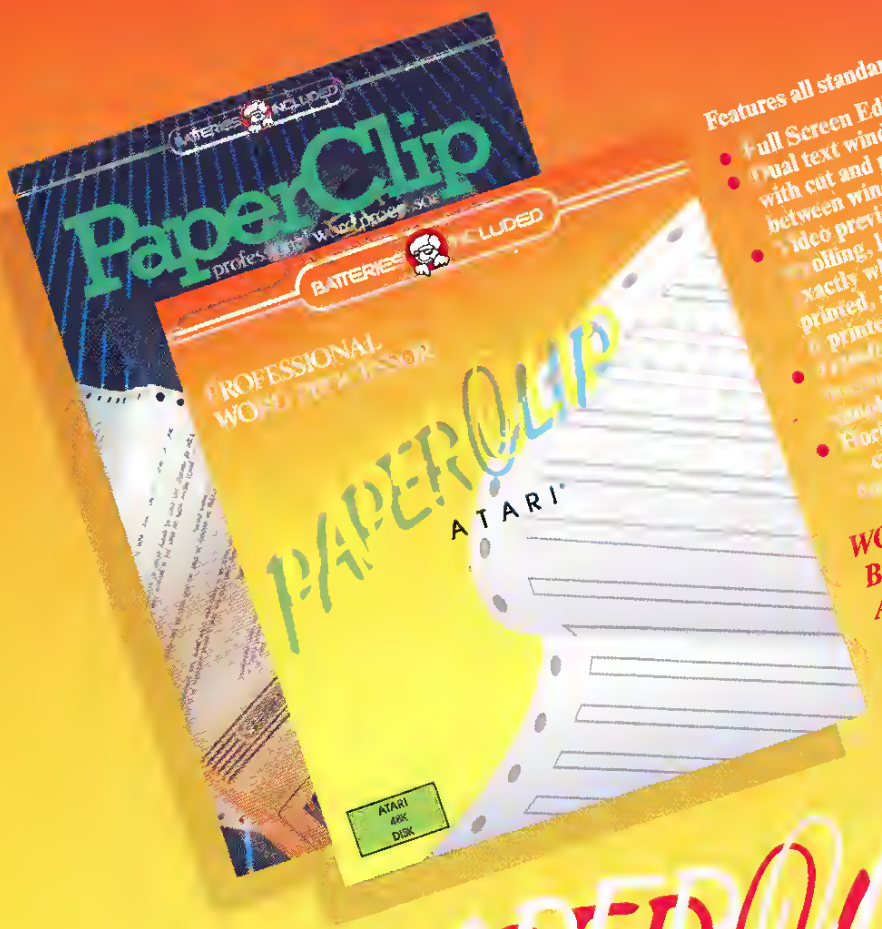

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COLOR THE COVER

Win a $499. Disk Drive

As you probably noticed, this month's cover is missing something . . . color. We decided to leave the coloring to you, for once.

This is your invitation to enter **Antic's Color The Cover Contest** and possibly win an Indus GT disk drive list-priced at $499.99. Send in a disk or cassette of your color rendition of the January **Antic** cover.

We're keeping the rules simple: You must use your Atari to reproduce the form and spirit of the cover drawing. Any Atari-compatible graphics hardware and software is eligible. You can reposition Super Utility Man to fit better across your video screen. And you can leave out all the cover text if you wish.

Of course, we recognize that it's hard to match the detailed quality of the cover's line art with your Atari. In fact, our publisher was the only one at **Antic** who thought it could be done.

So we are challenging you to use your creativity and come as close to reproducing the artwork as computer graphics technology allows.

You may work alone or collaborate with friends and family. Enter as many colorings as you want. But all entries must be received at **Antic** by February 1, 1985.

Be sure to send loading instructions along with your disk or cassette—plus a short note telling about yourself and your computer graphics tools.

The winning and runner-up microscreens will appear in the June, 1985 **Antic**. First prize is an Indus GT disk drive. Second and third prize are Antic T-shirts. All entries become the property of Antic Publishing, Inc. and will not be returned. Contest is void where prohibited.

Mail your entries to:
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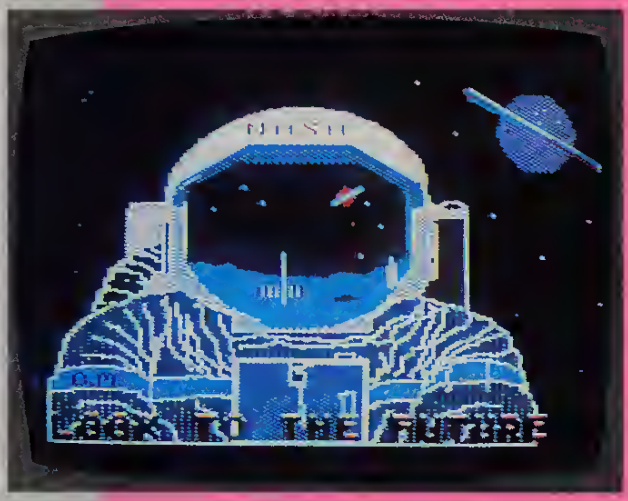
microscreens



Outer space is the theme for two of this month's **Antic** micoscreens. G. Manson of Sparks, Nevada presents a mysterious astronaut in "NASA".

San Franciscan Michael Green's ethereal "Moonview" was created using "Fun With Art" software.

We're not sure if our third microsceen, "Buddah" is supposed to be a scene from another planet or another dimension. Steven Dong, a medical school senior at the University of Texas, San Antonio, used up "valuable sleep time" to draw this with his Atari Touch Tablet.

If we publish your Atari computer art on our microscreens page, you get an Antic T-shirt. Send your pictures to **Antic** on disk or cassette with stamped self-addressed return envelope. Write loading instructions on a short note telling about yourself and which graphics tools you use . . . also include two choices of T-shirt size and color.

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i/o board

HELP US HELP YOU

I want to praise Antic for having the brains to publish "Brain Research with the Atari." I was sure an article like this would have been considered of too limited interest to have been published. Personally, I'd like to hear more about constructive uses of the Atari. I'm tired of games. Why can't your magazine offer a wider spectrum of articles?

Chuck Smithson
Reno, NV

We want to be of use to our readers. The only way we can be of use is to know what readers want to see,and the best way to communicate this is to write us.

—ANTIC ED

CURING COLOR DISTORTION

I have a problem with my BMC color monitor: distortion is caused when I use the RF modulator and my Atari. Contrasting colors aren't sharp, but often bleed several pixels to the right or cast shadows. Even in BASIC, using the default colors, characters cast a shadow about one-third the character width, to the right.

I sent the computer to Atari and they said it was a problem with the 1200XL. When they were done, it was "fixed," several changes had been made in the computer, and the problem still exists. Calling back, I was told they did not know how to fix it. Can you help me?

Michael Rutheford
Houston, TX

We're passing this along to you, our readers. If anyone has a solution, or ideas, let us know. —ANTIC ED

I/O ODDITY

When I work in immediate mode and I write

```
POKE 710,0: POKE 709,9:
LOAD "D FILE EXT"
```

I hear the loading program sound before the screen turns black. Why?

Ivan Antezana
Lima, Peru

Every 1/30th of a second, during the stage two vertical blank interval, certain registers in the operating system (OS) in ROM look into related registers in RAM and steal the values for their own use. The RAM registers are called shadow registers to the ROM registers. In the case of your program line, 709 and 710 are shadow registers for locations 53271 and 53272. The program line is being processed so fast by BASIC that it begins execution of the file I/O before the OS registers can get the new color values from the shadow registers. During I/O, the Critical I/O Region Flag at location 66 is set, which suspends the vertical blank transfer process, and the ROM registers have to wait to get their new colors. If you add just the slightest delay after the two POKEs in your line, (such as PRINT CLOG(8)) the registers will have the time to transfer colors and your screen will change before the drive runs. —ANTIC ED

RIBBON RESURRECTION

A tip for Atari 1027 printer owners. If you've had the same trouble I've had finding replacement ink rollers, buy an inexpensive stamp pad inker (roller type) and ink the roller with it. This produces much clearer, better defined letters than even a new roller!

Gene Schoepp
Barnegat, NJ

ACTION! HELP

O.S.S.'s Mike Fitch was kind enough to pass along some information regarding Dave Plotkin's "Lights, Camera, ACTION!" article in the July 1984 issue. The SAVETEMPTS and GETTEMPS routines described there are adequate only if the interrupt routine does not perform mathematical operations other than addition and subtraction. The following versions of those routines will work properly in more general cases. Change the arrays in SAVETEMPS and GETTEMPS to the following

```
SAVETEMPS="[$A2 $07 $B5 $C0 $48
   $B5 $A8 $48 $B5 $A0 $48 $B5 $80
   $48 $CA $10 $F2 $A5 $D3 $48]",
GETTEMPS="[$68 $85 $D3 $A2 $00
   $68 $95 $80 $68 $95 $A0 $68 $95
   $A8 $68 $95 $C0 $E8 $E0 $08 $D0
   $F0]"
```

STAR RAIDERS

In response to Carol Waskowski's inquiry in the July I/O Board about others attaining Star Commander Class 1 in Star Raiders, I can proudly announce that I have obtained that level on many occasions. (Although Star Raiders remains one of the most popular Atari games, only a handful of readers indicated that they have achieved commander 1 status.–ANTIC ED)

The difference between Star Commander 5 and 1 is one's efficient use of energy. Here are some tips to help you save energy and improve your score.

When entering an enemy-occupied quadrant, don't engage your engines. Let enemy ships come to you. Never chase enemies with damaged engines, for the energy you waste is more than the value of the enemy ship.

Attempt to destroy distant ships as soon as they are in sighting range, about 120 centrons. This requires pinpoint firing, but can be done with practice. This helps avoid the close combat that is so deadly at higher levels—hits on your shields cost 100 units each.

Always know where the nearest starbase is, and follow the advice in the third paragraph of survival tactics in the game booklet.

Turn off shields when you're not in combat. This saves energy. There is a chance of asteroid collision, but it is slim.

There are other tips, but this should help. The main idea is to conserve energy.

David Horne
Foster City, CA

WIPE OUT YOUR PROGRAM WITH ONE SIMPLE POKE

For those jaded Atari owners who are looking for just one more thing to do with their machines , we offer the following POKE 202,1. Place this poke in your favorite program and your program will be wiped from memory when it ends. Your program will also be wiped if you hit [BREAK] or [SYSTEM RESET]. In fact, anything which generates the READY prompt will result in erasure of the pro-

help!

gram. Interesting possibilities for protection schemes, no? Location 202 is the Load in Progress flag. When it has been set (by poking with a 1) the computer begins part of the load procedure immediately following the generation of the READY prompt. Among other things, the load procedure clears all program lines and variables from memory. —ANTIC ED

INVESTIGATING WITH ATARI

I am in the business of motor vehicle accident investigation and reconstruction. Are there any Atari programs available for purchase that deal with accident investigation, vehicle weights and measurements?

Eldon Shannon
Huntsville, AL

We don't know of any, but if anyone does, we'll pass the information along.
—ANTIC ED

INTERFACING COMPUTERS

I own both an Atari and a TRS Model 100. I use the TRS extensively at work and on the road, and the Atari at home. I would like to transfer text and download files from the TRS to the Atari.

Denny Bowen
Crystal Lake, IL

Please see the "Electronic Notebook" article in the July, 1984 issue of **Antic**. *It describes techniques for using the RS-232 connector (you'll need an 850 interface) and terminal software for both computers. This allows the machines to transfer data in ASCII.* —ANTIC ED

THE EDGE OF LETTER PERFECT

When using Letter Perfect on my color TV I can't see the first letters on the left. This may be due to the kind of TV I'm using here in the Amazon jungle. Is there anything I can do about this?

Carlos Malaga
Inquitos, Peru

The new Letter Perfect (version 6.0) has a Fix Window Width function that allows you to set the width of your display. Press [CTRL] [3]. If you don't have this updated version, contact LJK Enterprises. —ANTIC ED

MISSING INFOBITS

The assembly language source listing for "Infobits" (**Antic**, Dec. 1984) was left out of the previous issue. You'll find it in this issue's Software Library. —ANTIC ED

MISSING LINE IN ADVENT X-5

If you're running into a bit of trouble during your adventures in "Advent X-5" (**Antic**, Nov. 1984), it may be due to a missing line. Add the following line: 8020 RUN. If the program locks up, you may be mistyping line 1005. The "TYPO II" code for that line is EJ. Watch out for the character just before the inverse f in that line, it's a [CTRL] [B].

LITTLE BROTHER INSTALLED PROPERLY

I have found a problem with the installation of a color monitor with my Atari 400.

I used your article "Little Brother Grows Up," (April 1984) for a guide. The schematic on page 106 shows resistor R11 to have a value of 2.2 Ohms. This should be 2.2 kilo Ohms.

Matt Orsie
Budd Lake, NJ

Thanks—this is the first time we'd heard about this. It's harder to test hardware fixes than it is to try new software, and we appreciate all the comments we get.
—ANTIC ED

BIFFDROP

Last month's Game of the Month, "Biffdrop," by J.D. Casten had some pretty tough lines to type in. Now that we have a new "Typo" program, we thought you might like the "Typo II" line-by-line codes followed by the line numbers. See the "Typo II" instruction article in this issue.

MH 510	JE 4002
BQ 515	SB 4003
UC 520	CO 4004
BT 525	YA 4005
AV 580	YA 4006
IV 4000	MM 9000
KP 4001	

ANTIC 4/5 EDITOR

Because of some interesting quirks in the Atari XL screen editing system, the DEMO listing of the "Antic 4/5 Editor Animator," (page 66, October 1984), will not run without the Translator disk. To get DEMO to run without Translator, change both 36's in line 52 to 35, and change the 39 in line 522 to 38.

PLAYFUL PROFESSOR

We would like to thank you for the honorable mention given to us in the October 1984 issue of **Antic** for our Playful Professor Math Tutor. However, there *is* a cassette version for the Atari.

Roger Shiffman
Screenplay Intelligent Statements
Des Plaines, IL

MISSING TANK LINES

In our September Help! column, we ran a letter with improvements for "Use BASIC to Animate". Unfortunately, some lines were omitted from the letter. We print them below.

Add these lines.

```
1301 POKE 752,1:? :? "NUMB
ER OF PLAYERS (2,3, OR 4)"
;:INPUT K
1302 IF K<2 OR K>4 THEN ?
CHR$(125):GOTO 1301
1303 ? CHR$(125)
1351 IF K<>3 AND K<>4 THEN
 POKE 53249,0
1352 IF K<>4 THEN POKE 532
50,0
```

Change these lines to read:

```
1170 D1=D1+1:IF K=4 THEN A
=PEEK(634):ON ((A=7)+2*(A=
11)+3*(A=13)+4*(A=14)) GOS
UB 590,660,730,800:POKE 53
278,1
1180 D2=D2+1:IF K=3 OR K=4
 THEN A=PEEK(633):ON ((A=7
)+2*(A=11)+3*(A=13)+4*(A=1
4)) GOSUB 310,380,450,520:
POKE 53278,1
```

Note that line 1180 is overlong and must be entered without spaces.

STARTING A BULLETIN BOARD PART II

Antic Pix BBS Software

by SUZI SUBECK

You read last month's **Antic** article about starting your own bulletin board and you've had an extra phone line installed. You're ready to dedicate your Atari system to a BBS, but... where do you go from here? This month **Antic** answers two of the most frequently asked telecomputing questions, "What is the best BBS equipment—and where can I get it?"

First of all, there is no standard "best" configuration for an Atari-based bulletin board—literally dozens of combinations of equipment will work. What's best for *you* depends on your overall BBS goals, as well as the amount of cash you can spare for this project.

HARDWARE

The heart of a BBS is an auto-answer modem, which will allow your system to function in your absence. Certain modems require the currently hard-to-find Atari 850 interface. You will also need a printer and disk drives. The number and capacity of drives you use will determine the amount of programs you can upload and download.

The annual Buyers' Guide in **Antic** last month gave you our picks of the best modems, disk drives and printers at various price points and with a wide range of features.

SOFTWARE

Probably the most important factor in choosing BBS software is to make sure it's compatible with your hardware—and does all the jobs you want. There are several types of bulletin board software (Also see **Antic**, July and August, 1984). Here's where to get the most popular BBS operating programs:

FOREM will run on any Atari with one to four disk drives of any density—including both 5 1/4-inch and eight-inch disk drives. There are versions that operate with the Atari 850, the ATR 8000 CP/M interface, and other configurations. One version is tailored specifically for the MPP modem.

Matt Singer, the author of FOREM, sells all versions of the software from his Maryland home, with the exception of the latest MPP version which is sold directly by MPP for $50. Singer is currently selling FOREM XL for $100. Once you have purchased a program from Singer, regular updates are available for downloading from his BBS, or you can get updates by sending him a blank disk with $5 for postage and handling.

AMIS software is in the public domain. Easily downloaded from various bulletin boards, AMIS comes in three main varieties, MACE AMIS, Standard AMIS and Fast AMIS.

MACE stands for Michigan Computer Enthusiasts. And this large users group makes the software available from the Main MACE and MACE West boards at least twice weekly. It's a good idea to call ahead and find out what nights AMIS will be offered.

Standard AMIS is regularly available for downloading from the CLAUG BBS. From time to time, it is also found on most other boards running AMIS. You can also get it by sending a blank disk and return postage to the sysop of just about any regular AMIS BBS.

Fast AMIS has built-in modem commands for a Hayes Smartmodem. It requires some modification to run with an MPP, Signalman Mark 7 or Mark 12 modem. Fast AMIS requires a different method of auto-answer than other BBS programs, and demands a different setting of the modem's internal DIP switches.

Fast AMIS is one of the easiest programs to run because it's virtually self-maintained. Message files compact automatically. The program does not require a printer on-line as FOREM does, and the only jobs the sysop must perform are erasing the caller log and rotating uploads and downloads regularly. Fast AMIS is available

continued on page 14

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After each raid (if you've survived!), you'll be evaluated by the computer and awarded points based on such factors as: How difficult was the mission? How accurate was your bombing? How many enemy fighters did you shoot down? (Just as in real life, enemy fighter pilots get better at shooting down B-17's as time goes by!)

The more points you get, the closer you'll be to a promotion, and ultimately to wearing the General's shiny star.

This game's designer was the flight engineer on a B-29 bomber during the Korean War, and he's made sure everything about 50 MISSION CRUSH is historically accurate.

Surviving fifty missions and becoming General is no easy task. But if you do make it, send us a photo of the screen as proof, and we'll add to the celebration by awarding you a Certificate of Achievement.

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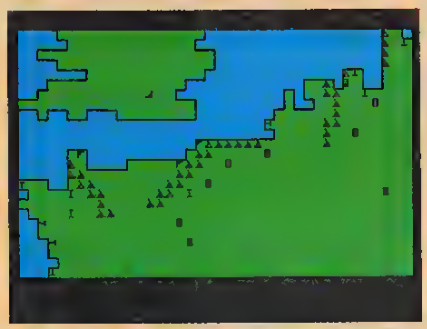

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STARTING A BULLETIN BOARD
continued from page 12

for downloading from the Valley Girl BBS at least once a week or by request.

Carnival software is essentially AMIS with an overlay to allow for private messages and passwords. It's no longer available from regular sources, but presumably could be obtained from a private owner. Carnival fell from wide usage because it demands a large amount of disk space and requires every bit of memory your system has.

If you plan to operate your BBS with an ATR 8000, you'll need to use MYDOS to boot the RS-232 handler, which will allow you to communicate with your modem. Because MYDOS returns different RS-232 status values than does Atari DOS, and because MYDOS has a different directory structure, you will probably need to modify any BBS software. Differences from the Atari DOS are pointed out in the MYDOS documentation.

Most sysops are more than happy to help out a sysop-to-be. They can provide you with a set of guidelines to use in setting up your board. Most of the long established systems you call today have experimented with various configurations of hardware and software , so they can offer excellent advice. Help is only a phone call away.

BBS SOFTWARE SOURCES

Fast AMIS
Public domain from Valley Girl
(312) 747-4247

.MACE AMIS
Public domain from Main MACE
(313) 978-1685; MACE West
(313) 582-0657

STANDARD AMIS
Public domain from CLAUG
(312) 889-1240.

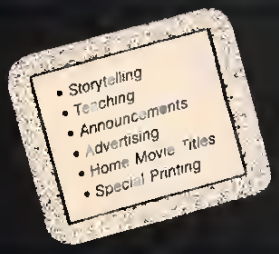
FOREM XL
$100. Matthew Singer, 6005 Cherrywood Court, Apt. 301, Greenbelt, MD, 20770. (301) 474-7583—voice, 5-8 PM, EST. (301) 474-7591—modem, 24 hours.

FOREM MPP
$50. Microbits Peripheral Products, 225 W. Third Street, Albany, OR 97321. (503) 967-9075.

Antic Contributing Editor Suzi Subeck is a sysop and users group newsletter editor based with her family in the southern suburbs of Chicago

BIGGEST BBS LIST STARTS NEXT MONTH!

Starting with February, in the next few issues of Antic we'll print the most complete and current list of Atari bulletin board systems we know of. This list is compiled by the Boise Users Group BBS, it's updated bi-weekly, and names close to 250 active Atari boards.



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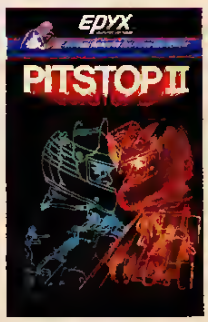

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BASIC SEARCHER

"Global search" for programmers

by SCOTT SHECK

Global search is one of the most useful editing functions found in good word processing software. Now you can make use of the same powerful editing tool when you're revising or debugging your own BASIC programs.

BASIC Searcher is a utility that can find all the lines containing any BASIC command, operator, function or variable in your program. It is compatible with BASIC XL (O.S.S.) and can be used with any BASIC program having line numbers below 31900.

First, type in the program listing, check it with TYPO II, and LIST it to disk using LIST "D:SEARCH.LST". Cassette owners should type LIST "C:"

HOW TO USE BASIC SEARCHER

Once the computer has a BASIC program in memory, type ENTER "D:SEARCH.LST or "ENTER C:" to merge your program with BASIC Searcher. Your program MUST be in memory before you ENTER the BASIC Searcher program!

Next, type GOTO 31900. After a brief pause, a list of your program's variables will appear on the screen. Occasionally, this list will include variables which no longer exist. This occurs because BASIC Searcher references your program's Variable Name Table which, in the case of a SAVEd file, may have retained previously deleted variables. To clear the Variable Name Table, LIST your program to disk or cassette, type NEW, and ENTER your program again.

BASIC Searcher finds the lines containing any command, operator, function or variable in your BASIC program. The program works on all Atari computers of any memory size. Antic Disk subscribers, follow the directions in the article.

Each variable in the list will be accompanied by a reference number. To locate a particular variable in your program, type in its corresponding reference number and press [RETURN].

Now, type [S] to have your results printed on the screen, or [P] to have your output sent to a printer.

The program will print an "END OF SEARCH" message when it's through. If you want to perform another search, type [Y]. If not, type [N] and BASIC Searcher will erase itself from your program.

BASIC Searcher can also find BASIC reserved words, constants and character strings. Just type in a reference number from the accompanying Table. If you were looking for every occurence of the POKE command, for example, you'd type in [31] and press [RETURN].

Although BASIC Searcher will find all references to specific variables, it cannot isolate individual constants or character strings. If you're searching for constants (reference number 14) or strings (number 15), BASIC Searcher will print out *all* references to *every* constant or string in your program.

HOW IT WORKS

BASIC Searcher looks for *tokens*, the one-byte codes which the Atari's BASIC interpreter uses to represent reserved words, variables and other pieces of information.

Tokens for BASIC reserved words are represented by ATASCII characters 0 through 84. The computer represents your program's variables with ATASCII characters 128 through 255. (This is why a program may not have more than 128 variables.)

As the computer interprets a BASIC program, each variable is assigned a token, beginning with ATASCII 128, and this token is appended to the Variable Name Table. At the same time, the variable's name is added to the Variable Name List, and its value is stored in the Variable Value Table. The computer uses these tables to keep track of your program's variables. BASIC Searcher looks through the Variable Name Table and the Variable Name List when analyzing your program.

continued on next page

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REFERENCE NUMBER TABLE

0 REM	43 GRAPHICS or (
1 DATA	44 PLOT or)
2 INPUT	45 POSITION or = [arithmetic]
3 COLOR	46 DOS or = [strings]
4 LIST	47 DRAWTO or <= [strings]
5 ENTER	48 SETCOLOR or <>
6 LET	49 LOCATE or >=
7 IF	50 SOUND or <
8 FOR	51 LPRINT or >
9 NEXT	52 CSAVE or =
10 GOTO	53 CLOAD or + [unary]
11 GO TO	54 Implied LET or –
12 GOSUB	55 ERROR [syntax] or ([strings]
13 TRAP	56 ([arrays]
14 all constants or BYE	57 ([DIM arrays]
15 all strings or CONT	58 ([functions]
16 COM	59 ([DIM strings]
17 CLOSE	60 , [arrays]
18 CLR or ,	61 STR$
19 DEG or $	62 CHR$
20 DIM or :	63 USR
21 END or ;	64 ASC
22 NEW	65 VAL
23 OPEN	66 LEN
24 LOAD	67 ADR
25 SAVE or TO	68 ATN
26 STATUS or STEP	69 COS
27 NOTE or THEN	70 PEEK
28 POINT or #	71 SIN
29 XIO or <= [arithmetic]	72 RND
30 ON or <>	73 FRE
31 POKE or >=	74 EXP
32 PRINT or <	75 LOG
33 RAD or >	76 CLOG
34 READ or =	77 SQR
35 RESTORE or	78 SGN
36 RETURN or *	79 ABS
37 RUN or +	80 INT
38 STOP or –	81 PADDLE
39 POP or /	82 STICK
40 ? or NOT	83 PTRIG
41 GET or OR	84 STRIG
42 PUT or AND	

Scott Sheck is one of the most creative and prolific utility programmers appearing in **Antic**. *Last month's issue featured his "Word Storage Space Saver," an almost fiendishly clever method of reducing memory waste in text storage.*

Listing on page 53

Introducing

TYPO II

Easier proofreading for Antic type-ins

TYPO (Type Your Program Once) by Bill Wilkinson of Optimized Systems Software started in the third issue of **Antic**—August, 1982. It was the first automatic proofreading program for type-in listings ever printed in a computer magazine. We reprinted TYPO several times and have been been using it with all our listings ever since—but now TYPO is going into a well-deserved retirement.

ENTER TYPO II.

The main trouble with the original TYPO is that it didn't show exactly what line contained a typing mistake. This made it too hard for beginners to use comfortably.

But TYPO II pinpoints every mistyped line—immediately after you type it. It can also find transposed characters which were invisible to its predecessor.

TYPO II even lets you use abbreviated commmands. But don't mix up PRINT with [?].

Antic tapped Andy Barton ("Info Bits," Dec., 1984) to write TYPO II. Andy cheerfully put the program through an extensive debugging process to make it compatible with all Atari computer models. Then when we believed the program was perfected, we asked Bill Wilkinson to look at it. And Bill contributed some ideas that enabled Andy to make TYPO II even shorter and simpler.

—ANTIC ED

HOW TO USE TYPO II

TYPO II *finds the exact lines* where you make mistakes while typing in **Antic** BASIC listings. This short all-BASIC proofreading program starts in the January 1985 issue, it works with all Atari computers of any memory size

Type in TYPO II and SAVE a backup copy to disk or cassette. (Users of the O.S.S. Basic XL cartridge must type SET 5,0 and SET 12,0 before they RUN the program.) To start TYPO II, type GOTO 32000. The TYPO II screen should appear, displaying the instruction, "Type in a program line."

Respond by typing in the first line of any 1985 **Antic** BASIC program. You will see the line reappear near the bottom of the screen— with a two-letter code at the left of the line number. Check these code letters against the correct two-letter code printed left of the same line in the magazine listing.

If the codes don' match exactly, you mistyped something in *that* program line. Simply press [RETURN] and the line will move back towards the top of the screen for editing. *Don't* type in those two-letter correction codes as part of the program line.

When the codes are an exact match, just type the next program line.

IMPORTANT: To call up *ANY previously typed line* for checking with TYPO II, type an asterix [*], followed (with no spaces in-between) by the number of the first program line you want to proofread. Then press [RETURN]. Use this procedure to check every line of TYPO II before you proofread other **Antic** programs with it.

You can LIST your program by pressing [BREAK] and typing LIST. Switch back into TYPO II anytime by typing GOTO 32000.

To remove TYPO II from your program: Type LIST "D:FILENAME",0, 31999 (Cassette owners LIST "C:",0, 31999). Type NEW, then ENTER "D:FILENAME" (ENTER "C:" for cassettes). Your program is now in memory without TYPO II and can be SAVEd or LISTed to disk or cassette.

(Of course, if you still get tired of typing in all six-or-more listings per issue —you can subscribe to **Antic** Magazine+Disk for only $99 95 yearly, and send for back issue disks at just $12.95 each. See order forms in this issue.)

Listing on page 52

INTERVIEWING DAN BUNTEN

Designer of "Seven Cities of Gold" & "M.U.L.E."

by ARTHUR LEYENBERGER

Ozark Softscape is located in the game design hotbed (?) of Little Rock, Arkansas and it has created two of the most impressive games available for the Atari—the 1983 award winning science-fiction economic simulation M.U.L.E. and 1984's graphics-scrolling conquistador simulation ***Seven Cities of Gold****. Both of these remarkable games are marketed by Electronic Arts (2755 Campus Drive, San Mateo, CA 94403, 415-571-7171).*

The principal game designer and most visible spokesman of Ozark Softscape is Dan Bunten, whose earlier games include Computer Quarterback, Cytron Masters, and Cartels & Cutthroats.

The rest of Ozark Softscape consists of:

Bill Bunten, Dan's brother, who has a Master of Business Administration degree and shares the design responsibility with Dan as well as being the primary play tester.

Jim Rushing, another MBA, who is kept busy writing most of the heavy-duty number-crunching code for the Ozark games.

Alan Watson, whose specialty is graphics and animation programming. He has a math background and ten years' experience in high-end stereo retailing.

Ozark Softscape has developed a game development routine, during its two years of existence. All four members decide what type of player experiences they want in their next game. Then Dan or Bill will produce a topic, flesh it out and bring it in for discussion. After the opening rounds, Dan and Bill come up with a game skeleton, including memory requirement estimates. From there, the work, and the fun, really begins.

Dan Bunten does not fit the programmer stereotype. Although he is an engineer by training, he prefers not to talk of bits and bytes but about what can be created with leading-edge technology. His interests range widely, from social biology to science-fiction, from philosophy to history and education . . .

Antic: How did you get the idea for Seven Cities?

Bunten: When my brother Bill and I were kids, my uncle gave us a book on the Conquistadors and we thought, Wow! Then there was a strategy board game from SSI, a war game called Conquistador that was part of their magazine. That was neat but it was awfully unplayable. We had a list of themes that were of interest to us and when we were ready to begin a new project we did not want to do another multi-player game like M.U.L.E. So we looked down the list and said, "Here's Conquistador."

Actually, we were not too excited about it at first. But as we started to do the research on it, we thought we could really do something good. After two months of research and just free-flowing ideas, we spent another month writing the story boards. Then six months of coding and it was out.

Antic: How far into the initial research phase do you go before you decide whether the concept will succeed?

Bunten: Normally, we just try to push through. To a certain extent we can always figure something out. Since there are a lot of people involved somebody will usually have an idea. There are the four of us in Ozark Softscape, there's our publishers at Electronic Arts, our play testers—somebody is going to come up with something.

The big idea with Seven Cities is the concept of Discovery. We have a giant world; spread it out, and it would be 12 by 20 feet. You are sitting there with a 3-1/2 inch window on this 12 by 20 foot world. That's big. You will never have a sense of knowing everything. You get lost or end up in the boonies.

The other things were to keep a pace going, to be fun, be easy. To transfer things was the most awkward part of the game. Yet it is actually pretty simple compared to other alternatives. But next time we will do those even better.

Antic: I think the game really does capture the flavor of what the Conquistadors must have been feeling. Especially with the random continent feature.

Bunten: Yes, in a random continent game, even when you find land, you

don't know what will be there. You can end up with a randomly generated continent full of a higher tech civilization than the Europeans.

Our model for that was the Japanese and Chinese. If the Conquistadors had landed in China or Japan, the Europeans would not have had a chance. They couldn't have come in and said, "We are going to blow you away and take everything you've got." They would have been lucky to get enough food to go back home.

Antic: When I first received Seven Cities, I thought, "Oh no, the manual doesn't tell you anything!" Then I started playing the game and figuring things out. The manual gives a historical perspective.

Bunten: Most people would just start playing the game. We looked at the possibility of not having to use a manual. We gave our testers just a disk and didn't say anything. It didn't go over wonderfully but some people loved the idea of discovering all of it.

And then I would get a call from somebody saying, "I can't get off my ship." They had never pushed the button standing still, to find the pull down menus. And "Drop Stuff Off" didn't sound like how you would get off your ship. Some of that has to be explained.

Antic: I thought "Drop Stuff Off" sounded a little strange.

Bunten: We pondered over that. If Antic readers can come up with a better phrase, we might even change it for the next version of the game. We were going to drop "stuffo" off (a Spanish word for it). We thought about "Transfer". Actually it was my wife's idea. I explained to her that what we were trying to do was drop stuff off, and she said why don't you just call it that. So we put it into a preliminary version and it stayed.

Antic: One feature of Seven Cities that I find difficult to understand is the way you might bump into the natives and accidentally kill them. Even when I am very careful, I still end up killing a few innocent natives.

Bunten: Because you don't share a language with the natives, your only way of communicating is by the gestures you make . . . your body language. All the natives can look at is

continued on page 25

In Seven Cities of Gold you're a Conquistador and ship captain searching for new worlds and treasure.

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Ozark's other game, M.U.L.E. takes place on a distant planet, where up to four players (only two players if you have an Atari XL) must either compete or cooperate to colonize this world in the allotted time. The four basic commodities—food, energy, Smithore and Crystite—are used by the players to increase their wealth and the overall well-being of the settlement.

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INTERVIEWING DAN BUNTEN
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whether your gestures seem neutral or hostile. The potential for missed cues on both sides is enormous. It may be stretching it, but we actually designed that specifically. Unfortunately it ended up looking like an arcade game that doesn't quite work, because these guys just bump into things and die.

Antic: Do you have any strategy tips for playing Seven Cities?

Bunten: The peaceful approach really works best. I have not used a totally depraved approach and won. You've got to have some friends somewhere. If something goes wrong, you need a friendly mission where you can go back and not have to worry about an insurrection or something. A place you can return to and know that there will be food, for example. You need a series of these relatively safe places even if you are going on a conquest mission.

If you continually abuse the natives you will eventually see a message from the king saying "Don't treat the natives so badly. But keep the gold coming." This double standard is straight out of history.

Antic: You treat the morality question in an interesting way.

Bunten: I do not want to preach to the player what is right and wrong. But I want to give them a chance to get in touch with themselves about how they do feel. In play testing we found that people would rationalize why they used force against the natives. They would say things like, "I only did it because the natives asked for too many gifts". People felt they had to explain their behavior.

Antic: How do you win Seven Cities?

Bunten: However you want. Seven Cities is a process type game, you go along like real life. Life doesn't have ends and wins and things like that. It has processes that you go through and at times you stand back and say, "Hey,

SEVEN CITIES OF GOLD

I've done pretty good so far" Set your own goals really high and say, "That's how I win." Then go for it.

Antic: In a way, this is really a learning game.

Bunten: Learning and fun are not mutually exclusive terms. Play is an important element in our lives. It is unfortunate that as adults we tend to regard play as a separate activity which you do when you have a little free time—rather than say there is a natural joy in learning.

As adults, our real joy comes from learning new things. Discovering or learning something new is done for pleasure. That's what it is all about. Having the opportunity to expand yourself, that's what is entertaining and educational.

Antic: How did you become involved with programming?

Bunten: I started out in Industrial Engineering and one of the first courses we had to take was programming, Fortran on a big IBM. The first time I got it to print A+B=C I was so excited. I did it and then I figured out that I could also make it print out little pictures with letters on a line printer. I though it was wonderful and I knew someday I was going to have my own computer, but I figured that I would have to be a millionaire first.

As it turned out, I got my first Apple computer in 1979 and I could do things at home. I was working as an Industrial Engineer and had access to a computer at work. So I wrote a few games for the enjoyment of myself and friends. I did some really goofy stuff.

Antic: Are you limited because of the hardware?

Bunten: That's a cop-out if we blame the hardware. The hardware helps but it isn't all there is. Look at the hardware of a book. I mean it is black and white on a piece of paper and yet it comes across. It's grammar among other things. We don't even know the software's grammar yet, much less how to develop characters and carry a plot line. We have a ways to go and are really at the beginning. But it is fun to be part of it.

Antic: What was your first commercial program?

Bunten: Wheeler Dealer. No one remembers it, only a hundred were sold. It was a 16K cassette game for the Apple. Integer Basic, and it required this hardware thing we made ourselves to allow four people to do the bidding in the game.

Antic: Does a person who wants to break into the game design field have to be a super coder?

Bunten: Not necessarily. There are a lot of good designers around who aren't great programmers. But knowledge of coding helps. Because you know the machine and when you push the boundaries you know what you can and cannot do. Knowing about human engineering also helps.

Antic: The human interface is really one of the strong points of Electronic Arts products. Their ease of use is a hallmark.

Bunten: It's amazing—M.U.L.E. was done years ago in an entirely different form for a 16K Apple—a real-time stock market simulation. It didn't go anywhere and probably never could have if it wasn't for a company like Electronic Arts. Their ability to support and guide us and to pull together ideas really helped. And patting us on the back, too, because we need a lot of that. We are out in the boonies and

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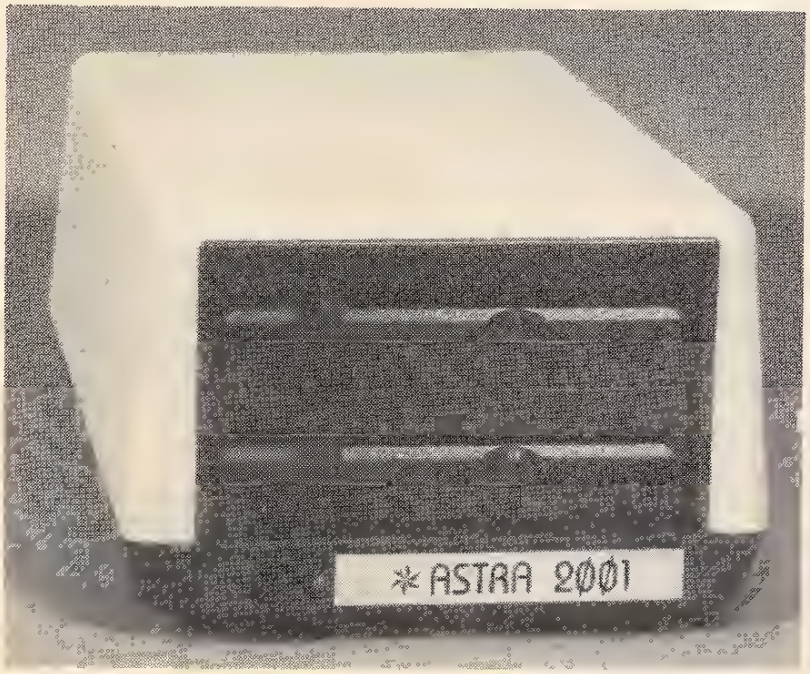

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INTERVIEWING DAN BUNTEN
continued from page 25

the attitude of people we deal with is "You write games for a living?" I really have to justify myself to my in-laws.

Antic: Can you talk about your next project?

Bunten: I could if I knew. We have a lot of ideas though. So we rented two cabins on a lake and are going on a retreat next week where we will relax and talk about what's next.

Antic: To what extent do you think a person's program reflects their personality?

Bunten: To an amazing extent. There are several people that I have not yet met, but I think I kind of know what they are like just having seen their games. You can tell if the guy was willing to get into the nitty gritty without concern for complexity. This is called dirt in war game programming terminology and some people actually enjoy the dirt and they will create games with a lot of it.

Antic: Do you think of yourself as a programmer turned artist or an artist turned programmer?

Bunten: None of the above really. I like the idea of being an artist but I think there is a lot more to be done and it is presumptuous to put that label on yourself. Real artists do things that pull your emotions in. A good film or a good book can play you like a fiddle.

Antic: Doesn't Seven Cities do that? When I get lost at sea for example, I'm very upset. My emotions are drawn in by the game.

Bunten: It is a start, a small step towards being able to do that. We have learned a little bit and have made a step. But the spectrum of emotions that we can create and trigger in software is limited right now. We are not yet to the point where you are going to cry because your character died. I want that, hut we won't see it until the software technology matures more.

Arthur Leyenberger is a human factors psychologist in New Jersey. He does microcomputer consulting and freelance writing. He's been an Atari activist for about three years. In fact, he conducted this interview while waiting at the airport with Dan Bunten after the game design star spoke to a users' group.

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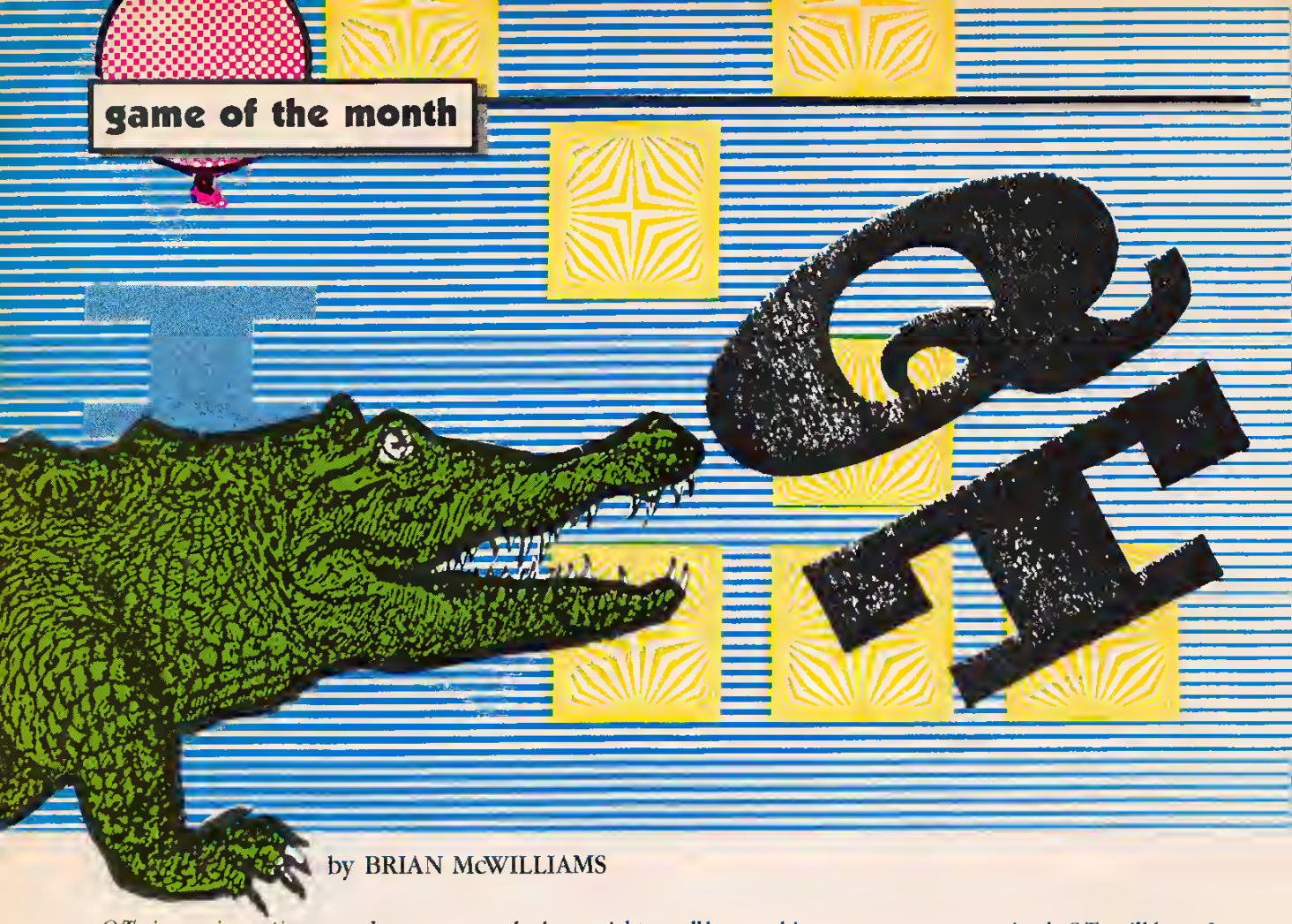


by BRIAN McWILLIAMS

Q.T. is an inventive arcade game boasting three different screens, each with six increasingly nerve-wracking levels of difficulty. The BASIC program runs on all Atari computers with 24K memory for cassette or 32K for disk. Antic Disk subscribers, RUN "D:QT.BAS"

Meet Q.T., a cute little bird who lives inside a dangerous arcade game. If you care about wildlife preservation, you'll help Q.T. survive six increasingly difficult levels of game play—on three different screens.

The first screen is crowded with ice cubes as Q.T. races the timer to put four corner blocks in their assigned positions. Q.T. gets points for eating cubes, or kicking them against the side walls with the joystick button. If the timer runs out before the (inedible) corner blocks are all correctly placed, "Bye bye, Q.T." There's less time at each higher level.

Your score is displayed in the upper left corner, the number of remaining lives is at the upper right. Displayed at the lower right are all bonus objects collected. High score also remains displayed until the computer is turned off.

A bonus object waits on a platform at the right of the second screen, while a deadly snapping jaw threatens from the left. Q.T. stands at the bottom of the playfield and can only move left or right— while catching objects falling from the top. Every missed object brings the snapping jaw closer; every object caught brings the bonus object nearer. Oh yes, Q.T. must *dodge* some of the falling objects—birdie-crushing I-beams.

Q.T. takes to the air in the third screen, trying to pop as many balloons as possible. Each balloon carries an item worth points. Q.T. moves left or right with the joystick. Pressing the fire button causes Q.T. to flap. Without flapping, Q.T. glides down. Balloons move faster in the higher levels.

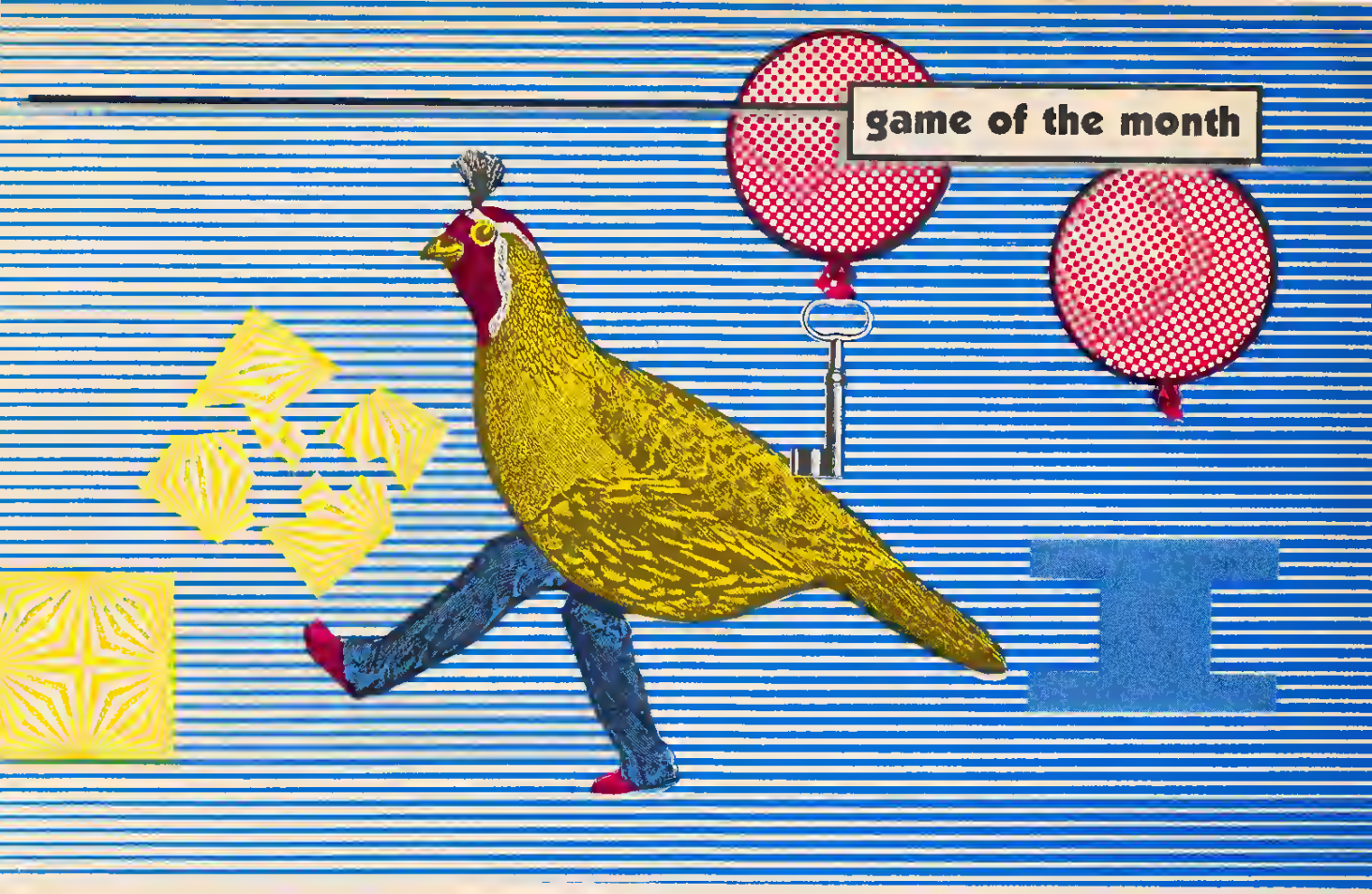
Q.T. can die by gliding off the screen, or by getting crushed with a falling object. If all six levels of the game are survived, Q.T. will be safe at last on the "You Win!" screen.

Type in the Q.T. listing, check it with TYPO II, SAVE a back-up copy and RUN the game. Your screen will go blank for about 10 seconds and then display the title screen. Press the joystick button to start. And be sure to press [RESET] before re-running the game.

Brian McWilliams is 17 and a senior at Alpena High School in Michigan, where he's able to take quite a few computer classes. He's currently working on an action game called "Droids."

Q.T. PROGRAM TAKE-APART

10	Dimension variables
20	Get high score
50–90	Title page
100–160	Main module
200–650	1st board



800–1030	2nd board
1050–1630	3rd board
1600–1630	Death routine on 3rd board
1640–1710	Q.T. introduces new bonus item
1800–1840	"You Win!" routine
7000–7310	Subroutines
7020	Erase screen
7100	Display score
7110–7120	Display lives
7130	Display time
7190–7260	Death routine
7270	Poke high score into memory
7300–7310	Takes care of timer
10000–10060	Changes character set
10070–10075	Data for USR call
10080–10180	Character set Data

Q.T. VARIABLE LIST

A$	Holds value of high score before POKEing it into memory
MOVE$	Holds ML subroutine for moving the character set
A	Reads stick position, loop variable, and other various uses
B,X,Y	Loop variable and other various uses
BC	Bird color
BI	Bonus item color
BIC	Bonus item counter
BLL	Balloon color
BLLY	Balloon Y-position
BONUS	Bonus accumulator
BRD	Board counter
C	Used to check an object's path for obstacles
C1	Use instead of "1"
CC	Check corner blocks' path for obstacles
CHANGE	Reads Data for new character set
FR	Falling rate and rising rate for objects or balloons
HI	Holds high score
IC	Item color for object to fall or item attached to balloon
INSET	Internal character code for character to be changed
IP	Object or balloon X-position
IV	Item value
JUNK	Variable used for USR call
LIVES	Number of lives left
LL,LR,UL,UR	Checks corners on first board
NH	Number of objects caught
NM	Number of objects missed
O	Used instead of "0"
OFF	Used instead of "7290"
SCORE	Current score
TIME	Time remaning
XP	X-position of Q.T.
XX	Loop variable
YP	Y-position of Q.T.
Z	Value of bonus item

Listing on page 54.

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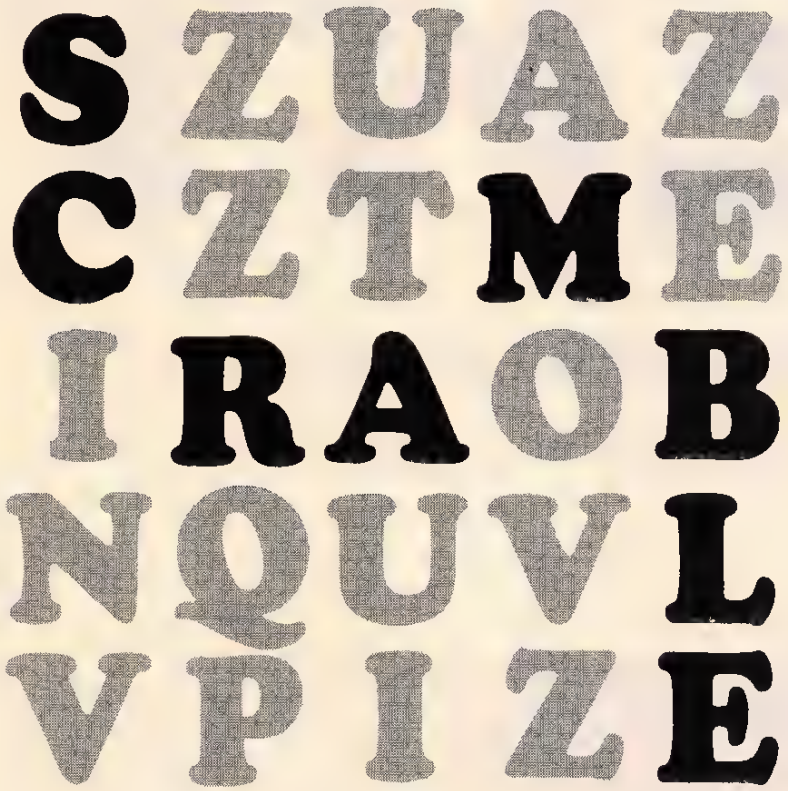
A computerized, competitive version of the familiar word finding puzzles. The BASIC program runs on all Atari computers of any memory configuration. Antic Disk subscribers RUN "D:SCRAMBLE. BAS".

SCRAMBLE



by F. NEIL SIMMS

Scramble is a one-or-two player word game designed to develop vocabulary and spelling skills in a way that's entertaining for all ages. A five-by-five grid of letters is presented to each player. The object is to form words by connecting *adjacent* letters together. The longer the word, the more points you receive. The number of points required to win may be chosen by pressing the SELECT key at the beginning of the game. Words must be between three and ten letters long.

To play, first type in the listing, check it with TYPO, and SAVE an extra copy for safety.

Each player competes simultaneously by manipulating the cursor around each board with his or her joystick (plug the joysticks into ports number 1 and 2). When the cursor is positioned over the first letter of a word you have spotted, press the fire button to mark the letter. Proceed to the next letter, mark it, and so on until the word has been spelled out completely. Then position the cursor over any one of these marked letters and press the fire button again to enter the word into a string array, from which your score will later be tallied.

Remember, the letters in the sequence must be adjacent (vertically, horizontally, or diagonally). For example, in the grid below, "darling" is legal while "ding" is not "Dared" is illegal since a specific letter may be used only once in each word.

```
Z Z E Z Z
Z D R G Z
Z L A N Z
Z Z I Z Z
Z Z Z Z Z
```

If you make a mistake while marking the letters, enter the erroneous word anyway; it will be deleted later when the words are reviewed at the end of the round.

The program surveys each player's set of words and deletes any duplicates. That is, if you enter the word "dog" twice in the same round, the second instance will be disregarded. Any duplicates will be displayed one at a time at the top of the screen, above the appropriate player's board. Press either fire button to pause during the review process.

Each player's words are presented for acceptance or rejection. A dictionary comes in handy here. Press either joystick to the left to accept a word and add its value to the player's score, or to the right to reject a word. After scoring is completed, if the minimum winning value has been reached, a winner is declared. Otherwise a new round is begun.

F. Neil Simms is a graduate student in Computer Science at Union College in Schenectady, New York. He started programming games on his Atari about two years ago, but now concentrates on utilities and graphics programs.

Listing on page 57

WIDE TEXT

Bold letters beef up graphics 0

by BILL MORRIS

It's been accepted as fact that you have to fold, spindle and mutilate the Atari display list in order to print bold, double-width Graphics 1 letters on a screen in the standard text mode, Graphics 0.

Even after you went through all this programming effort, you still wouldn't be allowed to put Graphics 1 letters on the same line as Graphics 0 letters. And inverse video Graphics 1 letters were completely out of reach.

WideText neatly solves all three problems. It's a short assembly language subroutine that lets you put standard or inverse Graphics 1 letters *anywhere* on a Graphics 0 screen. And you don't have to struggle with the display list.

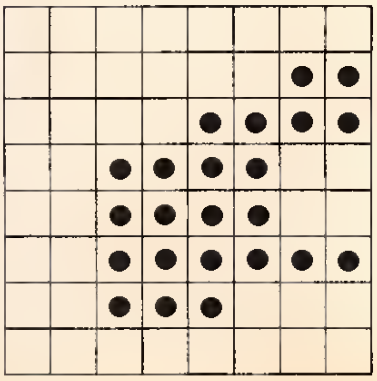
You can use the WideText subroutine in your own BASIC or machine language programs. **Antic** is publishing WideText here in a longer BASIC demonstration version. The actual subroutine is in binary load format in lines 6400-6520 and 20000-20280. We're also providing the assembly language source code for the subroutine.

The easiest and most powerful method ever developed for inserting bold double-width Graphics 1 letters anywhere on the screen in Graphics 0, the standard text mode. Works with all Atari computers of any memory size. But if you want to use the included source code, you'll need either Atari Assembler Editor or MAC/65. Antic Disk subscribers, RUN"D:WIDETEXT.BAS"

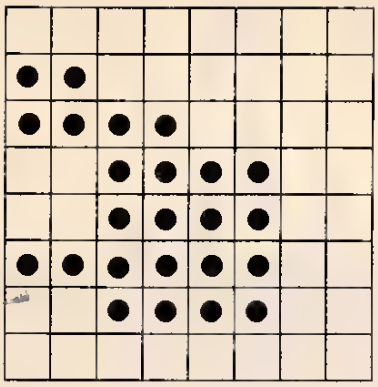
HOW IT WORKS

WideText redefines portions of the computer's character set to simulate the Graphics 1 letters. For example, the letters [CTRL] [A] and [a] have been redefined to look like:

[CTRL] [A]



[a]



Now when [CTRL] [A] and [a] are printed next to each other, they look like an "A" in Graphics 1. It works the same way with any other letter. If you want a Graphics 1 "X," you type [CTRL] [X] and then [x]. WideText only works for letters, not with numbers, punctuation marks, or special characters.

The routine that does this is in lines 20000-20280. You can use it to mix Graphics 0 and Graphics 1 letters in your own BASIC programs. Once included in your program, you can turn it on with the statement X = USR (1536).

You can also type with WideText's simulated Graphics 1 letters. First, set the variable WIDE equal to [1]. Now as you're typing, the routine in lines 6400-6520 substitutes the wider Graphics 1 characters on the screen for each Graphics 0 letter. To type with Graphics 0 letters, set WIDE to [0].

HOW TO USE WIDETEXT

Type in Listing 1, check it with TYPO II, and SAVE a backup copy. When you type RUN, the program will cycle through a demonstration of how WideText prints messages on the screen. You don't need to type either Listing 2 or Listing 3 in order to use Listing 1.

USING ASSEMBLY LANGUAGE WIDETEXT

Listing 2 is the WideText assembly language source code. To use it you need either an Atari Assembler Editor or O.S.S. MAC/65 cartridge. SAVE a backup copy after you type it in. Antic Disk subscribers, ENTER #D:WIDETEXT.ASM

Once a machine language program is assembled and you SAVE it as object code, it can become part of a BASIC program if it starts with a PLA instruction and ends with an RTS instruction.

Before BASIC can use object code, the code must be converted into DATA statements. Listing 3 will load the converted object code by POKEing this data into memory.

First, save the assembled machine code on a disk by typing SAVE #DPAGE6.OBJ<600,6FF

MAC/65 owners, type:

ASM,,#D:PAGE6.OBJ

If you wish to save the source code too, type:

LIST #D:WIDETEXT.ASM

Next, turn off the computer. Then reboot it with BASIC DOS. Use option L to load the machine-language routine into Page Six.

Exit DOS and use Listing 3, the PEEKER program, to generate the necessary DATA statements. Type in Listing 3, check it with TYPO II and SAVE a backup copy before you RUN it. Antic Disk subscribers, follow the applicable instructions above *before* using the DATA statements it generates.

IMPORTANT: Remember to delete the PEEKER program before using the DATA statements it generates.

Listing on page 89

ASSEMBLY LANGUAGE TAKE-APART

This take-apart is for Listing 2, the assembly language source code of the DATA statements in Listing 1.

130-190 Sets the variables. Page Zero locations must be chosen carefully, since few are safe from BASIC.

200 Holds the starting address.

210 The PLA at the beginning of a machine-language subroutine exposes the Return-To-Basic address on the 6502 stack.

220-370 Finds a 1K block of memory just below the bottom of screen memory and copies a slightly modified version of the ROM character set.

410-420 Stores unchanged copies of numerals and punctuation marks.

430-440 Stores unchanged versions of capital letters.

450 Uses the variable ONECHAR to store an extra copy of each value.

460-500 Shifts all bits in ONECHAR four places to the right, and stores the value in HALFCHAR.

510-520 Delete the leftmost four bits of ONECHAR.

530-540 Calls a subroutine that expands four-place bit patterns into eight-place bit patterns. Then, this new byte is stored as a control character. Eight of these bytes will form the right half of a wide letter.

550-580 Deletes the leftmost four bits of HALFCHAR, stretches the patterns to eight bits, and stores this new byte as a lower case letter. Eight of these bytes will form the left half of a wide letter.

590-620 Repeats character-redefining steps 208 times until we have a new alphabet. (26 letters x 8 bytes per letter = 208.)

630-730 Finishes copying and storing the character set.

740-750 Updates the character base pointer, 756 ($02F4).

760 Contains the "Return from Subroutine" (RTS) instruction.

Bill Morris is a San Francisco taxi driver. He just walked into ***Antic*** *one day with the WideText program. He also showed us his outstanding almost-finished machine language action game called Taxicab Hill.*

Touch Tablet

Control the cursor in your own BASIC programs with a KoalaPad or Atari Touch Tablet. Perfect for selecting menu options or educational quiz answers. The program works on all Atari computers of any memory size. Antic Disk subscribers, RUN "D:KOALA.BAS"

Here is an idea whose time has come: Touch tablets are the best off-keyboard controller devices.

Various computer magazines have recently pointed out that the touch tablet is a lot easier and more natural to handle than the joystick, paddle, track-ball, custom keypad—or even those highly-touted and expensive newcomers, the mouse and the touch-screen. And just as **Antic** went to press, Koala Technologies Corp. unveiled an over-$150 KoalaPad business applications controller for the higher-priced microcomputers.

This program lets you use the same principle with your Atari. You can incorporate Touch Tablet Controller into any BASIC program where the user must point to specific places on the screen. There's no reason why your KoalaPad or Atari Touch Tablet must be limited exclusively to graphics input.

Your computer "sees" the tablet as a pair of game paddles. The position of the stylus on the tablet's flat surface is defined by horizontal and vertical coordinates. The horizontal coordinate is read as PADDLE (0) and the vertical coordinate as PADDLE (1).

Similarly, the two touch tablet buttons are treated as game paddle trigger 0 (left button) and 1 (right button). Touch tablet buttons can also be read with the STICK (0) function as follows:

```
STICK (0) = 15  No buttons
                pressed
          = 11  Left tablet button
          =  7  Right tablet button
          =  3  Both tablet buttons
          = 14  Touch Tablet Stylus
          = 10  Stylus + left button
          =  6  Stylus + right
                button
          =  2  Stylus + both
                buttons
```

Unlike joysticks or game paddles, touch tablets can get from point A to point B while skipping all points in-between—not unlike a disk drive. We'll use this feature to create a tablet-controlled cursor. We'll also demonstrate how to use this cursor to choose options from menus and select answers in educational quizzes.

After you have used Touch Tablet Controller for a while, you'll probably think of other applications it can be adapted for. Please write to **Antic** about your discoveries, so other readers can share them.

USING THE PROGRAM

Type in the program, check it with TYPO II and SAVE a backup copy.

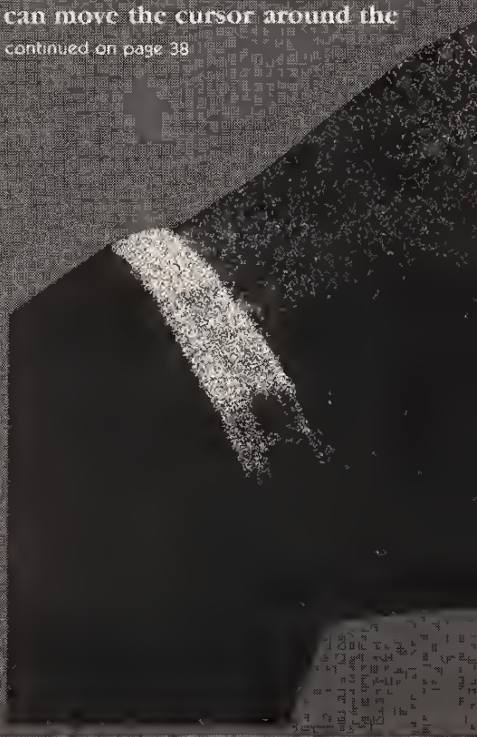
If you are using an Atari Touch Tablet: At the start of line 70 you must [DELETE] 70 REM (which will give you a substituted line 60). Also, in line 40 change 1593 to 1596. Press [RETURN] after making each of these changes.

Now plug your KoalaPad or Atari Touch Tablet into joystick port 1 and type RUN.

There is a brief delay while the program starts. You will see a menu display with four options. Press the stylus against the touch tablet and a diagonal arrow appears on the screen. The arrow's color continuously pulses and changes.

This arrow is your cursor. You can move the cursor around the

continued on page 38



Cursor

by KARL WIEGERS

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TOUCH TABLET CURSOR

continued from page 36

screen by sliding the stylus on the touch tablet. Lift the stylus and the cursor disappears.

The cursor will not be visible when the stylus is near the left or right edges of the tablet. This happens because most TV sets are only able to display horizontal coordinate values between 48 and 210.

Point the arrow toward one of the menu items and press a touch tablet button. You'll see a display telling you that your selection was accepted and the program branched properly. Menu option two shows how to use the touch tablet to select answers to questions printed on the screen. Press any touch tablet button to return to the main menu.

This example illustrates how easily a touch tablet can be used to indicate screen positions and accept input from the user.

HOW THE PROGRAM WORKS

In BASIC, paddles 0 and 1 are read by PEEKing memory locations 624 and 625. The range of possible values for horizontal and vertical coordinates on the KoalaPad are 3 (extreme left or top) through 228 (extreme right or bottom). For the Atari Touch Tablet it's 9 (extreme left or bottom) and 228 (extreme right or top). If the stylus is not pressed against the tablet, the default paddle values are 3 for the KoalaPad, and 228 for the Touch Tablet.

The arrow cursor is set up as player 0, using single line resolution. A vertical blank interrupt (VBI) machine language routine is used to read the position of the stylus and set the horizontal and vertical positions of the cursor. The VBI also changes the color of the player 15 times per second to create the pulsing effect. Using a VBI like this allows the touch tablet to be read frequently without interfering with the rest of the BASIC program. The VBI routine is turned on in line 370 with the statement A=USR(1536), and can be turned off with A=USR(AD).

Lines 260-310 set up a simple menu in Graphics 1. Line 400 loops until one of the touch tablet buttons is pressed. Lines 420-450 evaluate the vertical position of the stylus (PEEK(205)) and branch to appropriate routines for the different menu options. The button is ignored if the cursor is not pointing at one of the available options (line 460).

Options one and three show a screen display and wait for a button press to return to the menu (lines 470-520 and 680-730). The VBI is turned off when reaching these displays, so you won't see the arrow.

Option two poses a simple addition question and lets the user select an answer with the stylus and button. Line 590 evaluates the vertical coordinate of the cursor, and line 600 judges the horizontal coordinate. The empty FOR-NEXT loops keep the computer from reading the touch tablet button too rapidly.

The QUIT option in the menu goes to an exit routine at lines 740-760. This removes the cursor from the screen and turns off the VBI.

Karl Wiegers is a Ph.D. research chemist for Kodak in Rochester, NY. He's also a regular Antic author, specializing in graphics applications.

MANUFACTURERS

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Listing on page 61.

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DISKIO is a superb enhancement for DOS 2.0S. For openers, it provides access to nearly all the DOS functions directly from BASIC or Atari Assembler Editor. It also has an alphabetical disk directory display and needs only a few keystrokes for disk file operations. DISKIO works on any Atari computer with one or more disk drives. Antic Disk subscribers, RUN "D:DISKIO.BAS".

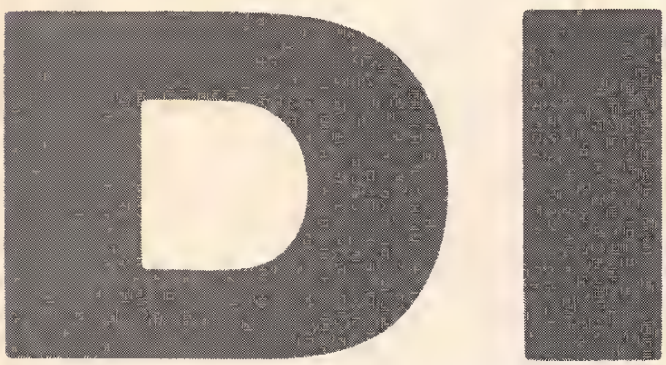
The day DISKIO arrived at **Antic** it became our in-house disk utility. It's that good!

DISKIO is a disk operations program that resides safely in memory and provides access to nearly all of the functions of DOS 2.0S directly from BASIC or from the Atari Assembler Editor cartridge. A number of similar "miniDOS" programs have appeared in various articles, but DISKIO removes the need for DUP.SYS more completely than any of these.

Moreover, DISKIO has a number of features that make it outstandingly easy to use, such as a two-column listing of the disk directory that is *alphabetized* and numbered, shortened commands that use those numbers, and a HELP menu that makes nearly everything self-explanatory.

Incredibly, that's not all! DISKIO also verifies potentially destructive commands, prevents renaming to an existing name, and is full compatible with the Atari BASIC and Assembly Editor cartridges.

Oh yes. . .and DISKIO occupies only 3K of memory, that's 25 disk sectors compared with 42 sectors for DUP.SYS. —ANTIC ED



READYING DISKIO

Use a disk containing DOS 2.0S (if the DOS.SYS file is 39 sectors long it should be okay). Type in Listing 1 exactly as it appears The program is designed to check itself, but if you use the new TYPO II, you'll be able to find typing mistakes right after typing each line. Once you have the program correctly typed in, SAVE a backup copy then RUN it. The message "READY TO CREATE AUTORUN SYS FILE?" will be displayed. Type [Y] and DISKIO will be created on disk as AUTORUN.SYS.

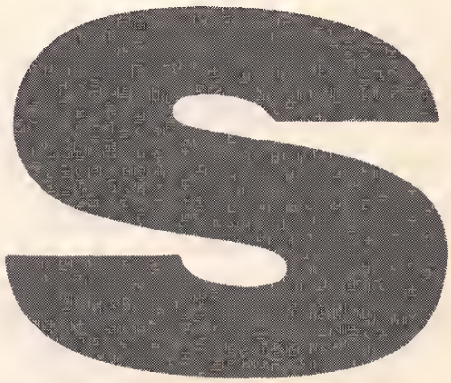
USING DISKIO

Boot your system with the disk containing the new AUTORUN.SYS file you just created, plus either Atari BASIC or Assembly Editor. DISKIO will be loaded into memory automatically. A message will be displayed indicating that DISKIO is present and suggesting that you type HELP [RETURN] to see the commands. If you do so, the HELP menu will appear on the screen:

DISKIO COMMANDS

	DIR	Directory
	DIRn	Dir. Drive n
	FORMAT	Format disk
	WDOS	Write DOS.SYS
.X->LI.->	LISTD	List to disk
.S->S. ->	SAVE	Save to disk
.E->E. ->	ENTER	Enter to mem.
.L->LO.->	LOAD	Load to mem.
.R->	RUND	Run disk file
.K->	LOCK	Lock file
.U->UN.->	UNLOCK	Unlock file
.N->RE.->	RENAME	Rename file
.D->DEL.>	DELETE	Delete file
.B->BL.->	BLOAD	Binary load
.M->M. ->	MOVE	Move file

.R9 runs #9 etc. To use DOS type KILL. Reboot to restore DISKIO.



The first column of the HELP menu lists the abbreviated .C commands which allow files to be designated by number rather than by name. The second column lists the abbreviated forms of the commands, the third lists the full command names, and the fourth gives a brief definition. Type DIR [RETURN] and the disk directory will be displayed in a manner similar to the one below:

SAMPLE DISKIO DIRECTORY

1	ASMSRCH	OBJ 002	8*	DUP	SYS 042
2	ASMSRCH	SRC 028	9	HMSG	SRC 010
3*	AUTORUN	SYS 025	10	RNMCHK	SRC 021
4*	DISKIO	OBJ 025	11	RTNLNTX	SRC 004
5*	DISKIOC	SRC 168	12	SCRSRT	SRC 051
6*	DISKIOZ	SRC 175	117 FREE SECTORS		
7*	DOS	SYS 039			

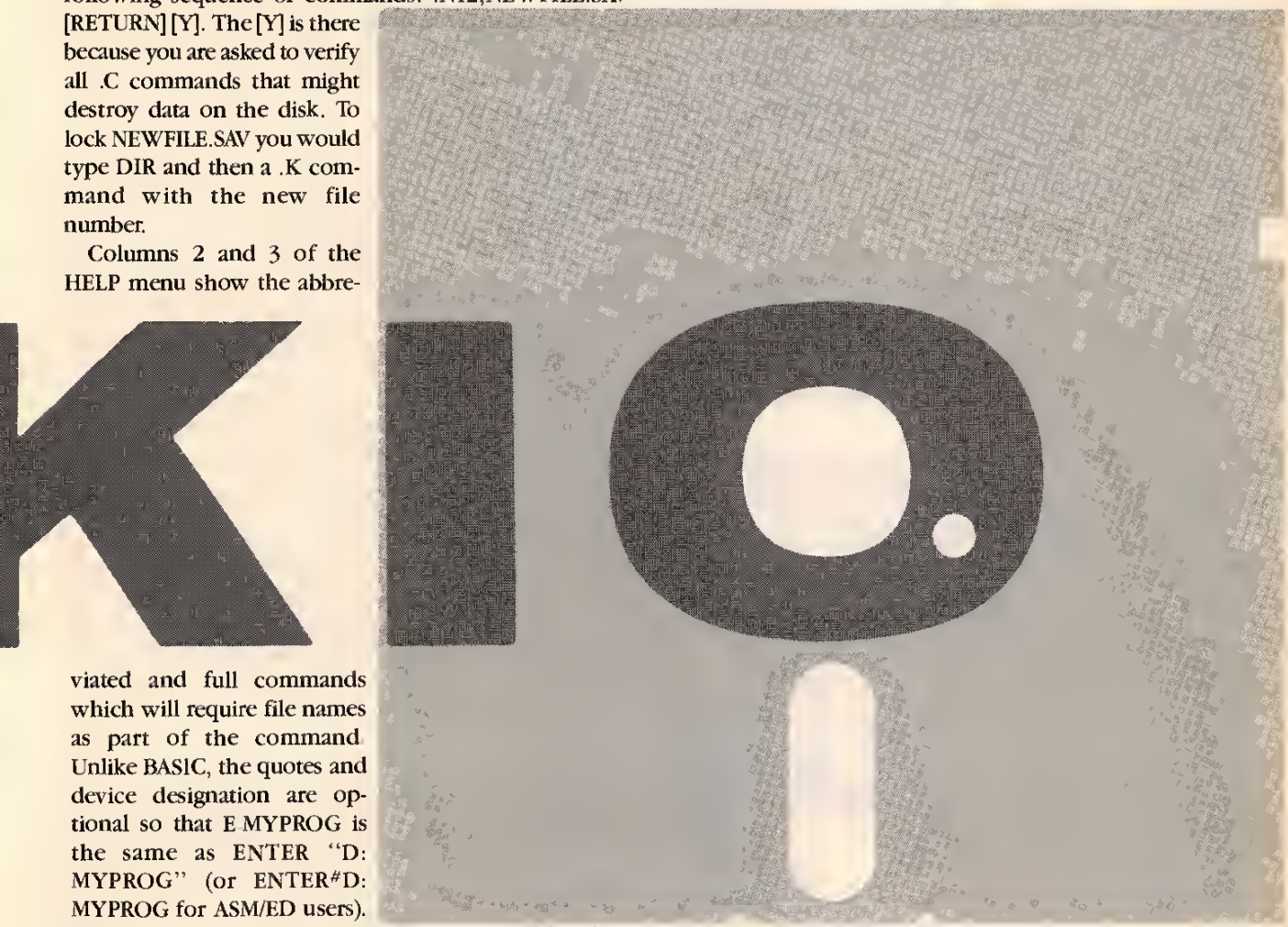
Notice that the directory is displayed in two columns, with the file names alphabetized and numbered. Up to 41 file names can be displayed simultaneously.

The DIRn command is discussed in the "Two Disk

Drives" section. The FORMAT command will format your disk after two safety prompts. The WDOS command will write DOS.SYS to the disk, but not DUP.SYS. The latter can be copied from another disk using the MOVE command (see below).

The .C commands (column 1 of the HELP menu) consist of a period, the command letter, and the file number. To use these commands the file name must be up on the screen as a result of a previous DIR command. For example, if 12*MYFILE.SAV is displayed, instead of typing RUN"D1:MYFILE.SAV [RETURN], all you have to type is .R12 [RETURN]. You can rename a file by entering the following sequence of commands: .N12,NEWFILE.SAV [RETURN] [Y]. The [Y] is there because you are asked to verify all .C commands that might destroy data on the disk. To lock NEWFILE.SAV you would type DIR and then a .K command with the new file number.

Columns 2 and 3 of the HELP menu show the abbreviated and full commands which will require file names as part of the command. Unlike BASIC, the quotes and device designation are optional so that E MYPROG is the same as ENTER "D:MYPROG" (or ENTER#D:MYPROG for ASM/ED users). These commands are handy when using wildcards to manipulate more than one file: LOCK *.*. Keep in mind that with the exception of FORMAT, there is no safety prompt with these commands. If you type DEL.MYFILE, MYFILE will be deleted.



The RENAME command will not permit you to use the same name as an existing file (you know what havoc that causes!). The BLOAD command will recognize the /N suffix (even in the .C form, like .B10/N) to bypass the initialization and run steps in the binary load process.

The MOVE command functions like the Duplicate File option in the DOS menu. The file is copied into memory, then the system pauses and the message INSERT DISK2;

Supercharger for Atari DOS

by DR. BERNARD E. OPPENHIEM

continued on next page

HIT ANY KEY (S=SCREEN) is displayed. If you type [S], the file will scroll up the screen. The scrolling can be halted and resumed by entering [CTRL] [1]. If you hit any other key the file is written back to the disk under the original file name. The only limitation here is that the file must fit into the available free RAM, or else the message "OUT OF RAM" will appear and the operation will be terminated. For 48K systems a file up to 233 sectors long can be moved when there is no program in memory.

To use DUP.SYS (via the DOS command) you must first remove DISKIO by typing KILL [RETURN]. To restore DISKIO the system must be rebooted. If the system is booted with no cartridge, DISKIO will return control to DOS and the DUP.SYS menu will appear. It should be noted that all DISKIO commands are active only at the READY level to keep DISKIO from interfering with user programs (think what trouble the KILL command would cause in an adventure game).

TWO DISK DRIVES

All DISKIO commands can be used with two disk drives. The command DIRn will display the directory for Drive n, for n=1, 2, 3, or 4. Furthermore, this command causes Drive n to become the default drive for all situations in which the drive number is not specified. For example, upon typing DIR2 [RETURN] the directory for Drive 2 is displayed, and a subsequent .C command will refer to files on that drive. FORMAT will format the disk in Drive 2 and WDOS will write DOS.SYS to it.

When using the MOVE command with two drives, only the files in drive 1 can be copied to the screen, and drive 1 files can only be moved to drive 1. However, when the directory for drive 2 is displayed, the MOVE command will automatically copy the designated file into memory, then immediately move it to drive 1 under the original file name.

FOR ADVANCED USERS

DISKIO is located between $ICFC and $2934, and protects itself by moving up MEMLO. It revectors the screen editor's GET BYTE routine, allowing it to compare all entries with a list of commands in a jump table. If a match is found the appropriate command is executed. Otherwise the entry is returned to the screen editor. DISKIO reinitializes itself upon [RESET].

DISKIO should not conflict with the user's program unless the latter overwrites DISKIO's reserved memory or moves MEMLO into it. All permanent storage is within the reserved memory, and LBUFF is used for temporary storage. Page One is used only for stack functions and page Six is not used. Page Zero is not altered since existing values are saved in the stack upon entering DISKIO and restored upon exiting.

The DISKIO AUTORUN.SYS file can be concatenated with other AUTORUN.SYS files which do not conflict with it. DISKIO should probably be the first segment in the chain to make it reset-proof.

For users with the Omnimon chip, the MOVE command can be used to modify disk files in Drive 1. After copying the file into memory the system pauses to allow the user to change disks. At this point Omnimon can be invoked, the file can be modified in memory, and then can be written back to disk with these keystrokes: [START] [RETURN] to exit Omnimon, [RETURN] to write the file back to disk, and [RESET] to restore some vectors.

Bernard E. Oppenheim is a nuclear medicine physician in Indianapolis. He has been programing in FORTRAN on large computers for 15 years and began programing the Atari in assembler two years ago. Dr. Oppenheim has contributed DISKIO to the public domain as of February, 1985 and Antic is pleased to introduce this important utility to the Atari users community.

Listing on page 62

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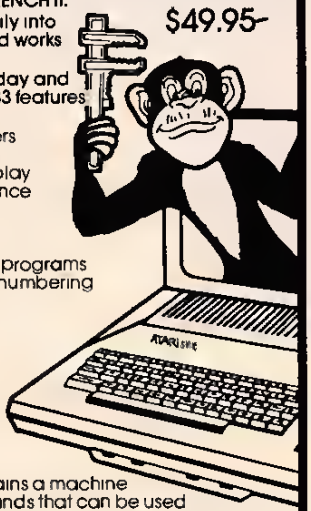

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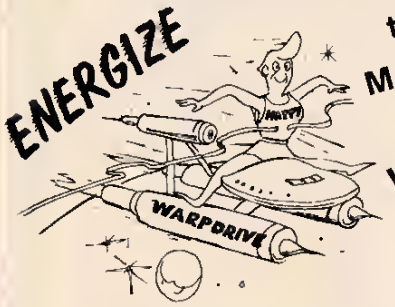

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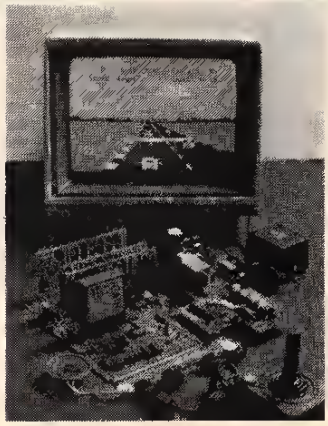

Atari 800 spare parts kit. Main, 10K OS REVB, CPU w/GTIA, 16K RAM, power board, cable, speaker $75
less 16K RAM $55
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Parts and supplies for Atari

THE PARALLEL BUS REVEALED

100,000 bytes per second

Part one of a four-part series

by EARL RICE

Until now, the Parallel Bus Interface has been one of the big mysteries of Atari XL computers. This important Antic series—by one of Atari's former top technical executives—will at last provide all the information necessary for tapping the power of this 100,000 byte per second connection.

If you own an Atari 600XL or 800XL, you've probably noticed a little plastic cover on the back. Above that cover are the words "PARALLEL BUS." Until now, this port has only been used for memory expansion cartridges.

Then last June at the Consumer Electronics Show, the Atari company finally released full specifications for the Parallel Bus Interface (PBI). This series of articles is based on that information.

In the next few issues of **Antic**, we'll explain how the parallel bus works and how you can use it with your own projects.

IMPORTANCE OF THE PBI

The parallel bus interface runs at the same speed as the 6502 microprocessor—and it can transfer information more than *40 times faster* than the serial connector.

The serial connector can transfer no more than 2400 bytes per second. The parallel bus can easily transfer 100,000 bytes or more per second, depending on software execution speed. This speed allows you to design controllers for hard disks and other high-speed devices.

WHAT THE PBI IS

Basically, the parallel bus connector is an extension of the 6502 data, address, and control signals. These signals aren't buffered, and can drive only a very limited electrical load. Unmodified, there isn't very much you can do with the PBI. When used with appropriate software and hardware, however, the PBI becomes an extremely powerful extension of your computer.

Fortunately, the PBI's design is easy to understand. Additionally, most of the software you'll need is already in the Operating System. This code, called the Generic Parallel Device Handler, resides at location 58511 ($E48F), just waiting to talk to your high-speed devices. All you have to do is write the low-level hardware driver software and combine it with your hardware.

But first you need to see how the PBI works.

A parallel device *(Figure 1)* is essentially a circuit board containing five key elements:

- A ROM chip containing both the low-level driver software and a Device Handler Table.
- Any RAM required for on-board buffers.
- Some address-decoding logic.
- A hardware-select register.
- The functional circuitry itself. (Perhaps an I/O device such as a universal asynchronous receiver/transmitter (UART) to drive a modem, or a parallel interface adapter (PIA) to drive a printer.)

All device registers, ROM, and RAM are mapped into your computer's memory space as shown in the simplified memory map *(Figure 2)*.

The PBI's ROM space is mapped into the same area as the OS conversion routines from ASCII to Floating Point. The computer's memory management IC switches out the OS ROM when an external device is selected, and switches back in when it's done. The catch is that your external device can't use the floating point software in the OS. It also can't use any function of the OS or application software

continued on next page

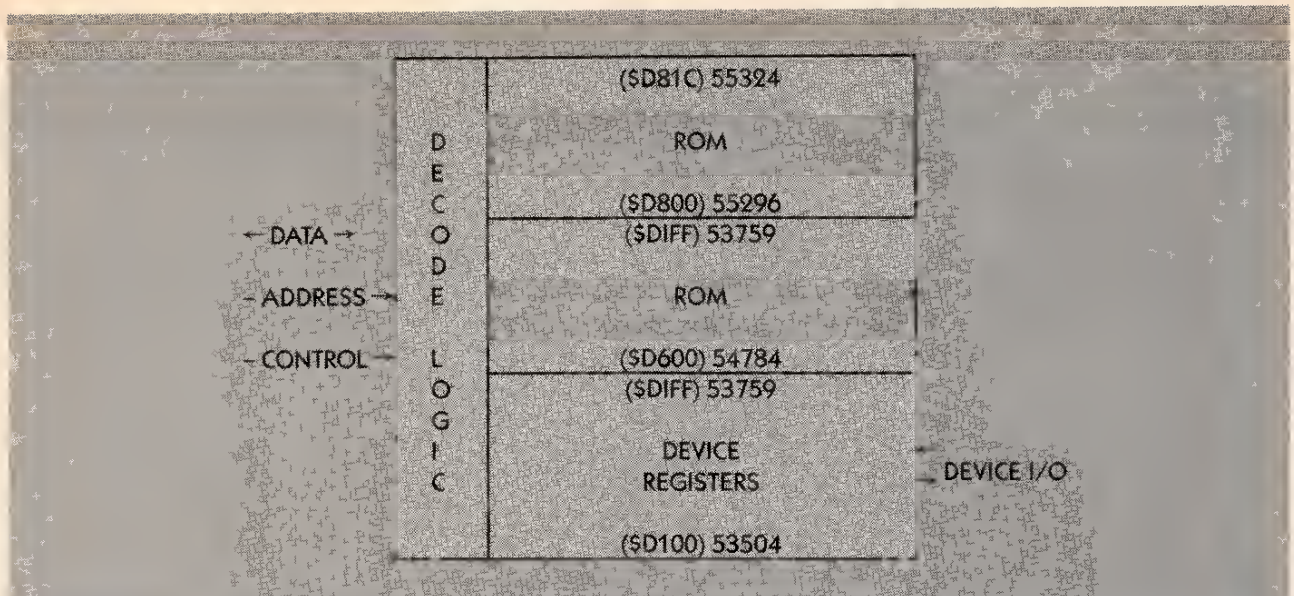

Figure 1
Parallel Device Block Diagram

(like BASIC) that uses floating point routines.

Since most external devices are essentially I/O peripherals, these restrictions should not create many programming problems.

The first 26 bytes of ROM contain a data table *(Figure 3)*. This is a handler table which has the same format as the other OS vector tables. Note that some of the data is optional. The required data consists of ID bytes used by the Generic Handler to validate the presence of a parallel device, and JUMP vectors to device functions.

During a coldstart, just before attempting to initialize a cartridge, the OS will poll for parallel devices. If the ID bytes are correct, the OS will execute the JMP to the INIT routine at 55321 ($D819) through 55323 ($D81B). This routine must put the address of the Generic Handler (58511, or $E48F) into the OS handler table (HATABS) along with the device name (T:, for example).

That done, your routine sets its select bit in the Device Mask, performs any device-specific initializations and ends with an RTS instruction.

That's really all it takes to let the OS "talk" to your device. Of course, there are the low-level device drivers to consider, but we'll examine them in a later article. For now, remember that the OS simply needs to know that your device exists (have its bit set in the Device Mask) and to have the Generic Handler's address in HATABS *(Figure 4)*.

The OS can handle up to eight devices on the PBI. The OS selects a device by setting the appropriate bit in the Hardware Select register, located at 53759 ($D1FF). BIT 0 selects DEVICE 0, BIT 1 selects DEVICE 1, and so on.

Just like the other registers in the computer, this one has a shadow loca-

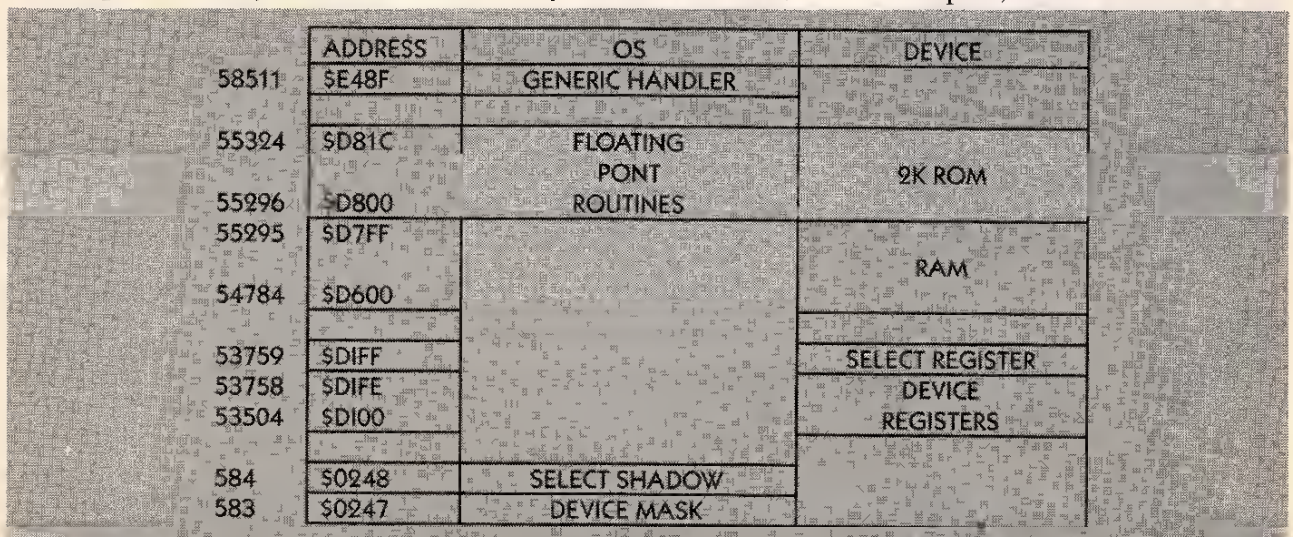

Figure 2
Parallel Device Memory Map

$D800 *ROM CHECK SUM LOW BYTE	$D80A INTERRUPT VECTOR HIGH BYTE	$D814 PUT BYTE VECTOR HIGH BYTE
$D801 *ROM CHECK SUM HIGH BYTE	$D80B ID NUMBER ($91)	$D815 STATUS VECTOR LOW BYTE -1
$D802 *ROM REVISION NUMBER	$D80C *DEVICE NAME (ASCII)	$D816 STATUS VECTOR HIGH BYTE
$D803 ID NUMBER ($80)	$D80D OPEN VECTOR LOW BYTE -1	$D817 SPECIAL VECTOR LOW BYTE -1
$D804 *DEVICE TYPE	$D80E OPEN VECTOR HIGH BYTE	$D818 SPECIAL VECTOR HIGH BYTE
$D805 JMP ($4C)	$D80F CLOSE VECTOR LOW BYTE -1	$D819 JMP ($4C)
$D806 I/O VECTOR LOW BYTE	$D810 CLOSE VECTOR HIGH BYTE	$D81A INIT VECTOR LOW BYTE
$D807 I/O VECTOR HIGH BYTE	$D811 GET BYTE VECTOR LOW BYTE -1	$D81B INIT VECTOR HIGH BYTE
$D808 JMP ($4C)	$D812 GET BYTE VECTOR HIGH BYTE	$D81C *UNUSED
$D809 INTERRUPT VECTOR LOW BYTE	$D813 PUT BYTE VECTOR LOW BYTE -1	

*OPTIONAL — NOT REQUIRED

Figure 3.
ROM Vector Table

tion The computer uses shadow registers to update the values in its hardware registers. These values are updated 30 times per second. The Hardware Select register's shadow location is at 583 ($0247).

SELECTING DEVICES

Before selecting a device, the OS looks at the Device Mask (location 583, $0247) to see if such a device really exists. Recall that this was the bit set by the initialization routine.

Parameters are passed between the OS and the device using the A, X and Y registers plus the Page Zero I/O Control Block (IOCB).

The carry flag tells the OS whether or not the device performed its requested function. The device sets the flag when it has performed its function. Otherwise, the carry flag is left RESET (0).

The A register passes a data byte, the X register contains the index to the originating device's IOCB, and the Y register contains a Device Status byte. This is the same as any other Central I/O (CIO) operation.

By the way, this is a good place to mention that Atari's Technical Reference Notes (C016555 Rev. A) are worth their weight in system errors. The basic operation of CIO, IOCB's, Device Status codes and the like are all presented concisely. If you are

continued on page 75

$031A	'P' (PRINTER NAME)	
$031B	HANDLER LOW BYTE	
$031C	HANDLER HIGH BYTE	
$031D	'C' (CASSETTE NAME)	
$031E	HANDLER LOW BYTE	
$031F	HANDLER HIGH BYTE	
$0320	'E' (EDITOR NAME)	
$0321	HANDLER LOW BYTE	
$0322	HANDLER HIGH BYTE	
$0323	'S' (SCREEN NAME)	
$0324	HANDLER LOW BYTE	
$0325	HANDLER HIGH BYTE	
$0326	'K' (KEYBOARD NAME)	
$0327	HANDLER LOW BYTE	
$0328	HANDLER HIGH BYTE	
$0329	0 (T)	← FIND THE FIRST 0 NAME ENTRY, THEN: PUT DEVICE NAME HERE
$032A	0 ($8F)	← PUT GENERIC HANDLER ADDRESS ($E48F) HERE
$032B	0 ($E4)	
$032C	0 (NAME SLOT)	
$032D	0 (VECTOR LOW SLOT)	
$032E	0 (VECTOR HIGH SLOT)	
$032F	0	
$0330	0	
$0331	0	
$0332	0	
$0333	0	
$0334	0	
$0335	0	
$0336	0	
$0337	0	
$0338	0	
$0339	0	
$033A	0	
$033B	0 (ALWAYS 0)	

Figure 4.
Putting Your Device In HATABS

Say goodbye to glitchy DOS 3 forever! Convert your files back to good old DOS 2.0S. You'll need three blank disks and your DOS 3 Master Disk. You'll also need the BASIC version of Eric Verheiden's SEQDOS program from "Cassette Lookalike—Your Disk Drive" on page 81 of the July, 1984 **Antic.**

ESCAPE FROM DOS 3

Your files will thank you

by CHARLES JACKSON
Antic Staff Writer

Many Atari programmers were bitterly disappointed when they tried Atari's newest disk operating system last year. DOS 3 turned out to be flawed, slow and user-hostile

Users had to correct the original DOS 3 versions with several obscure POKE statements from BASIC. All versions of DOS 3 store your programs in a format that is incompatible with virtually every other disk operating system. DOS 3 keeps each utility in a separate file. These utilities must be individually loaded or copied from the DOS 3 Master Disk before you can use them.

The final blow is that DOS 3 does not allow you to re-convert your programs back into DOS 2.0S after you converted them to DOS 3. Your only choice was retyping the whole program listing to SAVE on a DOS 2 disk . . . until today! continued on page 50

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ESCAPE FROM DOS 3
continued from page 48

PREPARING THE SEQDOS DISKS:

1. Using the SEQDOS.BAS program, prepare one SEQDOS disk with DOS 2 files, and one SEQDOS disk without DOS 2 files. (See Verheiden's article for instructions.)

2. Boot your DOS 3 Master Disk. Initialize the remaining disk with option "I." (Remember to type Y to write the FMS.SYS file.) You should also copy the KCP.SYS, KCPOVER.SYS and CONVERT. UTL files from your Master Disk to this disk

3. Return to the DOS 3 menu and use the "A" option to convert your SEQDOS BAS program (the one you just typed in) to DOS 3.

4. RUN the converted SEQDOS.BAS program. The computer will print:

   'PRESS RETURN TO FORMAT?"

   Then press the [BREAK] key and type DOS.

5. When the menu appears, type [S]. Then, type:

   AUTORUN.SYS [RETURN]
   600 [RETURN]
   6FF [RETURN]
   609 [RETURN]
   [RETURN]

   The computer will print

   AUTORUN.SYS SAVED

   This is your SEQDOS + DOS 3 disk. Remove it and put a write-protect tab on it.

At this point, you should have three disks: A SEQDOS disk, a SEQDOS + DOS 2 disk, and a SEQDOS + DOS 3 disk. You're now ready to convert any BASIC program from DOS 3 to DOS 2.

USING THE SEQDOS DISKS:

1. Boot the SEQDOS + DOS 3 disk, then insert the disk containing the program to be converted. LOAD (or ENTER) your program.

2. Insert your SEQDOS disk and type CSAVE [RETURN].

3. Boot your SEQDOS +DOS 2 disk then insert your SEQDOS disk. Type CLOAD [RETURN].

4. Your converted program is now in the computer's memory. It can be SAVEd or LISTed to any DOS 2 disk.

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TYPO II 52

► ***GLOBAL SEARCH COMES TO BASIC***

BASIC SEARCHER 53

► ***GAME OF THE MONTH***

Q.T. 54

► ***WORD GAME TO BOGGLE YOUR MIND***

SCRAMBLE 57

► ***BOLD LETTERING IN GRAPHICS 0***

WIDE TEXT 59

► ***KOALA IS MIGHTIER THAN MOUSE***

TOUCH TABLET CURSOR 61

► ***SUPERCHARGER FOR ATARI DOS***

DISKIO 62

► ***ASSEMBLER SOURCE CODE BONUS HELP!***

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TECH TIPS 64

DISK SUBSCRIBERS: You can use all these programs immediately. Just RUN the correct filenames shown at the start of each accompanying magazine article.

Antic Listing Credits. Gemini 10X Printer—$399 from Star Micronics, Inc , 200 Park Avenue, New York, N.Y. 10166 Lister Plus Software—$19.95 from Non-Standard Magic, PO Box 45, Girard, Ohio, 44420. (48K disk)

How To Use TYPO II

Type in TYPO II and SAVE a copy to disk or cassette.

Type GOTO 32000 and follow TYPO II onscreen instructions. If the resulting two-letter line codes are not exactly the same as those in the magazine, you mistyped something in that line.

To call back any line previously typed, type an asterisk [*] followed (without in-between spaces) by the line number, then press [RETURN]. This is also the way you use TYPO II to proofread itself.

To LIST your program, press [BREAK] and type LIST. To return to TYPO II, type GOTO 32000.

To remove TYPO II from your program, type LIST "D:FILENAME",0,31999 (Cassette owners LIST "C:). Type NEW, then ENTER "D:FILENAME" (Cassette—ENTER "C:). Your program is now in memory without TYPO II and you can SAVE or LIST it to disk or cassette.

BASIC XL cartridge owners type SET 5,0 and SET 12,0 before using TYPO II.

```
WB 32000 REM TYPO II BY ANDY BARTON
VM 32010 REM VER. 1.0 FOR ANTIC MAGAZINE
HS 32020 CLR :DIM LINE$(120):CLOSE #2:CLO
   SE #3
BN 32030 OPEN #2,4,0,"E":OPEN #3,5,0,"E"
YC 32040 ? "K":POSITION 11,1:? "[graphics]"
EM 32050 TRAP 32040:POSITION 2,3:? "Type
   in a program line"
HS 32060 POSITION 1,4:? " ":INPUT #2;LINE
   $:IF LINE$="" THEN POSITION 2,4:LIST 0
   :GOTO 32060
XH 32070 IF LINE$(1,1)="*" THEN 0=VAL(LIN
   E$(2,LEN(LINE$))):POSITION 2,4:LIST 0:
   GOTO 32060
TH 32080 POSITION 2,10:? "CONT"
MF 32090 0=VAL(LINE$):POSITION 1,3:? " ";
NY 32100 POKE 842,13:STOP
CN 32110 POKE 842,12
ET 32120 ? "K":POSITION 11,1:? "[graphics]
   ":POSITION 2,15:LIST 0
CE 32130 C=0:ANS=C
QR 32140 POSITION 2,16:INPUT #3;LINE$:IF
   LINE$="" THEN ? "LINE ";0;" DELETED":G
   OTO 32050
VV 32150 FOR O=1 TO LEN(LINE$):C=C+1:ANS=
   ANS+(C*ASC(LINE$(O,O))):NEXT O
WJ 32160 CODE=INT(ANS/676)
JW 32170 CODE=ANS-(CODE*676)
EH 32180 HCODE=INT(CODE/26)
BH 32190 LCODE=CODE-(HCODE*26)+65
HB 32200 HCODE=HCODE+65
IE 32210 POSITION 0,16:? CHR$(HCODE);CHR$
   (LCODE)
VG 32220 POSITION 2,13:? "If CODE does no
   t match press [graphics] and edit line a
   bove.":GOTO 32050
```

Sometimes it's not easy to tell apart the following characters, shown here in both normal and inverse video. Be especially careful when you type any of these:

[graphics]	CTRL F	[graphics]	/
[graphics]	CTRL G	[graphics]	SHIFT +
[graphics]	CTRL N	[graphics]	SHIFT -
[graphics]	CTRL R	[graphics]	-
[graphics]	CTRL S	[graphics]	+

Typing Special Atari Characters

Shown below are the Atari Special Characters as printed in Antic listings—and the keys you must type in order to get them.

Whenever the CTRL key (CONTROL on XL models) or SHIFT key is used, *hold it down* while you press the next keys. Whenever the ESC key is used, *press and release* it before typing the next keys.

Turn on inverse video by pressing the Atari logo key once. Turn it off by pressing a second time. (XL models use the Reverse Video Mode Key instead.)

NORMAL VIDEO	
FOR THIS	TYPE THIS
[graphics]	CTRL ,
[graphics]	CTRL A
[graphics]	CTRL B
[graphics]	CTRL C
[graphics]	CTRL D
[graphics]	CTRL E
[graphics]	CTRL F
[graphics]	CTRL G
[graphics]	CTRL H
[graphics]	CTRL I
[graphics]	CTRL J
[graphics]	CTRL K
[graphics]	CTRL L
[graphics]	CTRL M
[graphics]	CTRL N
[graphics]	CTRL O
[graphics]	CTRL P
[graphics]	CTRL O
[graphics]	CTRL R
[graphics]	CTRL S
[graphics]	CTRL T
[graphics]	CTRL V
[graphics]	CTRL W
[graphics]	CTRL X
[graphics]	CTRL Y
[graphics]	CTRL Z
[graphics]	ESC ESC
[graphics]	ESC CTRL -
[graphics]	ESC CTRL =
[graphics]	ESC CTRL +
[graphics]	ESC CTRL *
[graphics]	CTRL .
[graphics]	CTRL ;
[graphics]	SHIFT =
[graphics]	ESC SHIFT CLEAR
[graphics]	ESC DELETE
[graphics]	ESC TAB

Boxes are drawn around the normal video characters here so you can see their positions more accurately, these boxes do not appear in the printed listings

INVERSE VIDEO	
FOR THIS	TYPE THIS
[graphics]	CTRL ,
[graphics]	CTRL A
[graphics]	CTRL B
[graphics]	CTRL C
[graphics]	CTRL D
[graphics]	CTRL E
[graphics]	CTRL F
[graphics]	CTRL G
[graphics]	CTRL H
[graphics]	CTRL I
[graphics]	CTRL J
[graphics]	CTRL K
[graphics]	CTRL L
[graphics]	CTRL M
[graphics]	CTRL N
[graphics]	CTRL O
[graphics]	CTRL P
[graphics]	CTRL O
[graphics]	CTRL R
[graphics]	CTRL S
[graphics]	CTRL T
[graphics]	CTRL U
[graphics]	CTRL V
[graphics]	CTRL W
[graphics]	CTRL X
[graphics]	CTRL Y
[graphics]	CTRL Z
[graphics]	ESC SHIFT DELETE
[graphics]	ESC SHIFT INSERT
[graphics]	ESC CTRL TAB
[graphics]	ESC SHIFT TAB
[graphics]	CTRL .
[graphics]	CTRL ;
[graphics]	SHIFT =
[graphics]	ESC CTRL 2
[graphics]	ESC CTRL DELETE
[graphics]	ESC CTRL INSERT

BASIC SEARCHER

Article on page 17

See TYPO II Page 52

LISTING 1

```
OC 31900 REM SEARCH UTILITY
0C 31901 REM BY SCOTT SHECK
GN 31902 REM ANTIC MAGAZINE
FR 31903 GOSUB 31907:POKE 4,1:POKE 2,PEEK
   (136):POKE 3,PEEK(137)
0L 31904 ZZ=USR(1536):IF PEEK(4)=0 THEN 3
   1925
JF 31905 A=PEEK(0)+PEEK(1)*256:IF X=10 TH
   EN LIST "P",A:GOTO 31904
GX 31906 LIST A:GOTO 31904
AW 31907 RESTORE 31900:GRAPHICS 0:IF PEEK
   (1537)<>216 THEN FOR X=1536 TO 1630:RE
   AD A:POKE X,A:NEXT X
XG 31908 DATA 104,216,160,0,177,2,133,0,2
   00,177,2,133,1,201,124,200,11,165,0,20
   1,156,200,5,160,0
RP 31909 DATA 132,4,96,200,177,2,133,204,
   200,200,177,2,197,203,200,4,32,91,6,96
   ,201,0,240,35,201,1
CX 31910 DATA 240,31,201,14,200,4,169,7,2
   00,7,201,15,200,11,200,177,2,132,206,2
   4,101,206,168,177,2,201,20
YU 31911 DATA 240,209,201,22,200,206,32,9
   1,6,76,2,6,0
OH 31912 DATA 165,2,24,101,204,133,2,144,
   2,230,3,96
SJ 31913 ? :? ,"SEARCH UTILITY":POKE 82,0
   :COUNT=120:ZZ=PEEK(130)+PEEK(131)*256:
   ? :? COUNT;" ";
MN 31914 A=PEEK(ZZ):? CHR$(A-120*(A)=120)
   );:IF A<128 THEN 31919
VI 31915 COUNT=COUNT+1:IF PEEK(ZZ+1)=90 A
   ND PEEK(ZZ+2)=210 THEN 31920
TZ 31916 IF COUNT=148 THEN POKE 82,14:POS
   ITION 14,2
KU 31917 IF COUNT=160 THEN POKE 82,20:POS
   ITION 28,2
AW 31918 ? :? COUNT;" ";
YM 31919 ZZ=ZZ+1:GOTO 31914
MR 31920 POKE 82,2:POSITION 2,23:? :? "NU
   MBER";:INPUT A:POKE 203,A:? "SCREEN OR
    PRINTER";
IK 31921 X=PEEK(764):IF X<>10 AND X<>62 T
   HEN 31921
JJ 31922 ? "R":RETURN
WF 31923 ? "R":? :FOR ZZ=31900 TO 31914:?
    ZZ:NEXT ZZ:? "CLR:POKE842,12:CONT";:P
   OSITION 2,0:POKE 842,13:STOP
00 31924 ? "R":? :FOR ZZ=31915 TO 31920:?
    ZZ:NEXT ZZ:? "CLR:POKE842,12:?CHR$(12
   5)";:POSITION 2,0:POKE 842,13:END
TO 31925 ? :? "END OF SEARCH":? :? " AGAI
   N (Y/N) ?";:POKE 764,255
KZ 31926 IF PEEK(764)=43 THEN POKE 764,25
   5:GOTO 31900
VO 31927 IF PEEK(764)=35 THEN POKE 764,25
   5:GOTO 31923
JK 31928 GOTO 31926
```

ERROR FILE

OCTOBER OMISSIONS October '84

A number of division signs [/] were omitted at the printer. On the magazine pages there is an empty space where they should have appeared. Here are the specific corrections:

MOLE ATTACK

Page 53
Line 20: POKE 756,S/256

Page 54
Line 1060: T=18-L/2

Page 55
Lines 1090 and 1110:
PEEK (20)0/(60)
Line 1140: 756,S/256
Line 1160:
IF AB/2<>INT (AB/2)
Line 1170: AC=1 TO AB/2
Line 1330: 756,S/256

PLUS MINUS

Page 56
Line 469:
SOUND 0,40,10,N/4
Line 9020: CHBASE/256

Page 57
Line 10014:()*,./:

BOUNCING BALL

Page 57
Line 110: INT(X/256)

ANTIC 4/5 ANIMATOR/ EDITOR

Page 59
Line 84: A N T 1 C 4/5

Page 63—In an unrelated error, the following two lines were left out of listing 3:

```
2820 FOR J=1 TO 10:
       FOR I=0 TO 8
2822 K=USR(COPY
     ,48,F(10+I),AW)
```

Page 66
"HYPNO.BAS"
Line 210: ADDRESS/256)
Line 220: (BYTES/256)

"DEMO"

Line 10: ERASE/PRINT

DIVER

Page 69
Line 550: #6;"/"
Line 630: 0)*20)/(SK+1
Line 650: *200)/(SK+1))
Line 670: *15)/(SK+1)

continued on next page

Q.T.

Article on page 30.

LISTING 1

```
PT 1 REM Q.T. BY ORIAN MCWILLIAMS
NC 2 REM ANTIC MAGAZINE JUNE 1984
NH 10 DIM MOVE$(32),A$(5):LIVES=3:OFF=729
   0:C1=1:GOSUB 1000B
TE 20 FOR H=C1 TO PEEK(1699):A$(H,H)=STR$
   (PEEK(1699+H)):NEXT H:HI=VAL(A$)
IK 50 COLOR 61:PLOT 0,C1:DRAWTO 19,C1:PLO
   T 0,21:DRAWTO 19,21
GM 55 PLOT 2,5:DRAWTO 17,5:DRAWTO 17,9:DR
   AWTO 2,9:DRAWTO 2,5
HF 60 COLOR 162:PLOT 0,2:DRAWTO 0,20:PLOT
    19,2:DRAWTO 19,20:COLOR 34:PLOT 4,2:D
   RAWTO 4,4:PLOT 15,2:DRAWTO 15,4
EG 70 COLOR 47:PLOT 4,11:DRAWTO 0,11:DRAW
   TO 0,15:DRAWTO 4,15:DRAWTO 4,11:PLOT 1
   1,11:DRAWTO 15,11:PLOT 13,12
WV 00 DRAWTO 13,15:PLOT 7,14:PLOT 9,16:CO
   LOR 175
HY B5 PLOT 11,15:PLOT 15,15:POSITION 3,6:
   ? #6;"antic magazine":POSITION 6,0
KO 90 ? #6;"PRESENTS":POSITION 3,10:? #6;
   "programmed  by":POSITION 2,20:? #6;"O
   RIAN MCWILLIAMS"
GJ 100 GOSUB 7000:ORO=ORO+(ORO<3)-2*(ORO=
   3):OIC=BIC+(BRO=C1):Z=50*OIC:POSITION
   C1,23:? #6;"top ";HI
IQ 105 IF OIC=7 THEN 1000
YH 125 OI=72*(OIC=C1)+74*(OIC=2)+75*(OIC=
   3)+50*(BIC=4)+06*(BIC=5)+01*(OIC=6):GO
   SUB 7020:IF ORO=C1 THEN GOSUB 1640
WM 130 GOSUB 7020:COLOR 61:PLOT 0,C1:DRAW
   TO 19,C1:DRAWTO 19,22:DRAWTO 0,22:DRAW
   TO 0,C1
OO 140 GOSUB 7100:GOSUB 7110:TIME=750-(OI
   C*50):NI=10+5*OIC:GOSUB 7130
5G 150 ON ORO GOSUB 200,000,1050
LS 16B GOTO 100
RJ 2B0 COLOR 47:FOR H=C1 TO 75+10*BIC
OG 21B A=INT(10*RND(O))+C1:O=INT(20*RND(O
   ))+2:LOCATE A,0,C:IF C<>32 THEN 210
GA 220 PLOT A,0:NEHT H:FOR H=C1 TO 4
FK 240 A=INT(16*RND(O))+2:B=INT(10*RND(O)
   )+3:LOCATE A,0,C:IF C>36 AND C<41 OR A
   =9 AND 0=9 THEN 240
HV 250 COLOR 36+X:PLOT A,B:NEXT X:BC=42:H
   P=9:YP=10:GOSUB 7065
GH 30B IF  NOT STRIG(O) THEN GOSUB 460
KL 310 A=STICK(O):A=(A=14 OR A=10 OR A=6)
   +2*(A=7)+3*(A=13 OR A=9 OR A=5)+4*(A=1
   1):ON A GOSUB 350,420,410,440
V0 320 LOCATE C1,2,UL:LOCATE 10,2,UR:LOCA
   TE 1B,21,LR:LOCATE C1,21,LL:IF UL=37 A
   ND UR=30 AND LR=39 AND LL=40 THEN 600
XW 340 GOSUB 7300:POKE 77,O:GOTO 300
QP 350 Y=-C1:H=O
GS 360 LOCATE HP+X,YP+Y,C:IF C=32 THEN GO
   SUB 7030:RETURN
PH 370 IF C=47 THEN GOSUB 7090:GOSUB 7030
   :RETURN
LQ 300 IF  NOT H THEN IF C>36 AND C<41 OR
    C=BI THEN 400
ZR 390 RETURN
KK 400 LOCATE HP+H*2,YP+Y*2,CC:IF CC=32 T
   HEN GOSUB 7040:GOSUB 7030
ZP 405 RETURN
GQ 410 Y=C1:H=O:GOTO 360
OO 420 IF OC=43 THEN OC=42:Y=O:H=O:GOSUB
   7030:RETURN
0M 430 Y=O:H=C1:GOTO 360
PF 440 IF OC=42 THEN OC=43:Y=O:H=O:GOSUB
   7030:RETURN
UN 450 Y=O:H=-C1:GOTO 360
JC 460 C=44*(OC=42)+95*(BC=43):COLOR C:PL
   OT HP,YP
```

ERROR FILE

EXPLORING THE XL

June '84

There was a misprinted Inverse video zero. In line 230, what appears as inverse "Or" should instead read "0r", replacing the capital letter with a zero.

RECALL

August '84

To get this program to run, you must first 'LIST' it to disk or cassette, type 'NEW' then type: DiM QQ$(1). After this, 'ENTER' the program and it should run. 'SAVE' this version which will run from then on without the preliminaries.

CREEPY CAVERNS

August '84

In line 10, change MO(N,5) to MO(P,5). In line 349, there is a YO(Y-ZERO) that should be YO (Y-O). The first change will prevent an error 3 and the second an error 9.

SPACED-OUT NUMBERS

July '84

For non-XL machines, change line 31040 as follows:

```
31040  D=INT (VAL(C$)/
          INT(100^(68-B(0))
          +1.OE-03)).
```

MATCHBOX TIC-TAC-TOE

April '84

Change line 2078 to: 2078 CLOSE #3:RETURN

UPDATE DISKS WITH NOTE AND POINT

April '84

Line 160 should read GOTO 600. Lines 410, 440, 470, 500 and 530 should all begin: INLEN=LEN(USER$).

MATH WIZARD

April '84

The 17th string character in line 50 should be an inverse zero. This will genereate the proper Typo table.

See
TYPO II
Page 52

```
LQ 465 FOR X=B5 TO 45 STEP -C1:SOUND 0,X,
   10,10:XEXT X:GOSUB OFF
UY 470 GOSUB 7B65:LOCATE XP-(BC=43)+(BC=4
   2),YP,C:IF C=32 OR C=61 TXEN RETURN
IB 490 IF BC=42 TXEN 520
LX 500 FOR X=XP-C1 TO C1 STEP -C1:LOCATE
   X-C1,YP,CC:IF CC<>32 TXEN GOSUB OFF:RE
   TURN
EY 510 SOUXO 0,114-X,10,12:COLOR 32:PLOT
   X,YP:COLOR C:PLOT X-C1,YP:XEXT X:GOSUB
    OFF:RETURN
KV 520 FOR X=XP+C1 TO 10:LOCATE X+C1,YP,C
   C:IF CC<>32 TXEN GOSUB OFF:RETURN
ZK 530 SOUND 0,114+X,10,12:COLOR 32:PLOT
   X,YP:COLOR C:PLOT X+C1,YP:XEXT X:GOSUB
    OFF:RETURN
JN 600 GOSUB 715B:FOR X=2 TO 21:LOCATE C1
   ,X,C:IF C=32 OR C=42 OR C=43 TXEN 620
JT 610 POSITION C1,X:GOSUB 640
PR 620 LOCATE 10,X,C:IF C=32 OR C=42 OR C
   =43 TXEN 650
XM 630 POSITION 10,X:GOSUB 640:GOTO 650
UC 640 ? #6;CXR$(BI+120):GOSUB 710B:RETUR
   N
LM 650 XEXT X:SCORE=SCORE+BOXUS+TIME:GOSU
   B OFF:RETURN
OX 6BB COLOR 32:PLOT 0,2:PLOT 0,3:PLOT 19
   ,2:PLOT 19,3:PLOT 4,22:DRAWTO 15,22:CO
   LOR 61:PLOT 0,4:ORAWTO 2,4:PLOT 19,4
RN 610 DRAWTO 17,4:PLOT 3,21:PLOT 16,21:P
   LOT 3,20:DRAWTO 16,20:COLOR 34:PLOT C1
   ,2:PLOT C1,3
YI 620 PLOT 10,2:PLOT 10,3:PLOT 0,5:DRAWT
   O 0,21:PLOT 2,5:DRAWTO 2,21:PLOT 19,5:
   DRAWTO 19,21:PLOT 17,5:DRAWTO 17,21
GA 630 COLOR 93:PLOT 2,3:COLOR BI+120:PLO
   T 17,3:NM=3:NX=NM
WW 650 XP=9:YP=19:BC=42:GOSUB 7B65
NB 660 FOR XX=C1 TO 11-BIC:A=STICK(0):A=(
   A>4 AND A<0)+2*(A>B AND A<12)
RB 665 COLOR 62:PLOT 2,NM:ON A GOSUB 420,
   440:GOTO B75
OC 670 FOR A=C1 TO 10:XEXT A
YW B75 COLOR 93:PLOT 2,NM:NEXT XX
OU 600 A=IXT(4*RNO(0))+C1:IC=64*(A=1)+47*
   (A=2)+35*(A=3)+0I*(A=4):IP=IXT(14*RNO(
   0))+3
CV 605 IV=2*(IC=0I)+5B*(IC=64 OR IC=47)
ZW B90 FR=(IC=64 OR IC=50 OR IC=72 OR IC=
   74)+2*(IC=75 OR IC=47)+3*(IC=35 OR IC=
   06 OR IC=01)
GC 695 A=INT(2*RNO(0))+C1:IC=IC+120*(A=2)
FF 900 FOR XX=2 TO 10 STEP FR:COLOR IC:PL
   OT IP,XX:A=STICK(0):A=(A>4 AND A<0)+2*
   (A>0 AND A<12)
VW 905 IF  NOT A TXEN FOR X=C1 TO 10:NEXT
    X
XS 907 ON A GOSUB 420,440:COLOR 32:PLOT I
   P,XX
WS 910 SOUNO C1,57+XX,10,9:NEXT XX:SOUNO
   C1,0,0,0:LOCATE IP,19,C:IF C<>32 TXEN
   IF IC=163 OR IC=35 TXEN 7190
OG 920 COLOR IC:PLOT IP,10+(C=32):FOR X=C
   1 TO 5:NEXT X:X=IP-XP:Y=-(C<>32):GOSUB
    7090:COLOR 32:PLOT XP+X,YP+Y
MJ 925 IF IC=163 OR IC=35 TXEN 960
SW 930 IF C=32 TXEN 1000
VV 940 COLOR 32:PLOT 17,NX:POSITION 17,NX
   +C1:? #6;CXR$(0I+120);CXR$(34);" ":COL
   OR 61:PLOT 17,NX+2:ORAWTO 19,NX+2
JO 950 NX=NX+C1:GOSUB 7170:GOSUB OFF:SCOR
   E=SCORE+IV
SW 960 GOSUB 7100:IF NX<19 TXEN 660
MI 970 X=C1:Y=0:FOR XX=XP TO 17:GOSUB 420
   :NEXT XX:GOSUB 7150:FOR XX=NM TO 10:GO
   SUB 7160:GOSUB 7100:NEXT XX
VS 900 SCORE=SCORE+00NUS:RETURN
RM 990 GOTO 060

UZ 1B0B GOSUB 716B:IF NM<19 TXEN B6B
IM 102B FOR X=2 TO XP:COLOR 62:PLOT X,19:
   FOR Y=C1 TO 5:SOUNO 0,157-X,10,1B:NEXT
    Y:COLOR 93:PLOT X,19:GOSUB OFF
WY 1030 FOR Y=C1 TO 5:NEXT Y:COLOR 32:PLO
   T X,YP:XEXT X:GOSUB OFF:GOTO 719B
NE 105B COLOR 32:PLOT C1,22:DRAWTO 1B,22:
   COLOR 61:PLOT C1,4:ORAWTO 4,4:PLOT 15,
   4:DRAWTO 1B,4
YE 1070 XP=4:YP=3:BC=42:GOSUB 7065
LB 108B IF BLL TXEN 110B
SO 1090 FOR XX=C1 TO 11-0IC
KV 1095 IF  NOT NI THEN RETURN
0I 1100 POKE 77,0:GOSUB 710B:IF  NOT STRI
   G(0) THEN 150B
ZF 1105 FOR A=C1 TO 25:NEXT A
EN 1110 B=STICK(0):A=(B>4 AND B<B AND BC<
   >92)+2*(B>B AND B<12 AXO BC<>92)+3*(B>
   4 AND B<B AND BC=92)
AX 1120 A=A+4*(B>B AND B<12 AND BC=92):ON
    A GOSUB 420,440,155B,1530:GOTO 114B
YC 1130 FOR A=C1 TO 15:NEXT A
CA 1140 LOCATE XP,YP+C1,C:IF C=32 AND BC<
   >92 THEN 0C=92:GOSUB 7B65
VG 1150 IF C=61 AND BC=92 TXEN BC=42*(XP<
   5)+43*(XP>14):GOSUB 7B65
LU 1160 IF C=33 OR C=161 TXEN C=92:GOTO 1
   32B
VO 117B IF BC=92 AND YP=22 TXEN 1600
OG 118B IF STRIG(0) AND BC=92 THEN COLOR
   32:PLOT XP,YP:YP=YP+C1:GOSUB 7B65
WS 1190 IF  NOT BLL AND XX TXEN NEXT XX:X
   X=0
OC 1200 IF 0LL THEN 124B
EF 1210 A=INT(3*RNO(0))+C1:IC=35*(A=C1)+6
   3*(A=2)+0I*(A=3):A=INT(2*RNO(0))+C1
EP 1220 BLL=33*(A=C1)+161*(A=2):IP=INT(10
   *RNO(0))+C1:IV=10*(IC=35)+50*(IC=63)+2
   *(IC=0I)
ZA 1230 FR=(IC=35)+2*(IC=63 OR IC=75 OR IC
   =74 OR IC=72)+3*(IC=5B OR IC=01 OR IC
   =06):0LLY=20
MM 1235 A=INT(2*RNO(0))+C1:IC=IC+12B*(A=2
   )
IO 1240 FOR A=0LLY-C1 TO BLLY-FR STEP -C1
   :LOCATE IP,A,C:IF C=32 TXEN NEXT A
UB 1300 COLOR 32:PLOT IP,BLLY:ORAWTO IP,0
   LLY+2:BLLY=A+C1:COLOR 0LL:PLOT IP,0LLY
   :COLOR 41:PLOT IP,BLLY+C1:COLOR IC
EG 1310 PLOT IP,BLLY+2:SOUNO C1,150+0LLY,
   10,3:IF C=32 TXEN 1000
0T 1320 COLOR 59:PLOT IP,0LLY:FOR X=10 TO
    0 STEP -C1:SOUND C1,56,0,X:NEXT X:SOU
   NO C1,0,0,0:COLOR 32:PLOT IP,0LLY
FA 1325 IF C=92 TXEN SCORE=SCORE+IV
AF 1327 0LL=0:NI=NI-C1
WU 1330 COLOR 32:PLOT IP,0LLY+C1:FOR A=0L
   LY+3 TO 22:LOCATE IP,A,C:IF C=92 TXEN
   COLOR 32:PLOT IP,A-C1:GOTO 1600
IM 1340 COLOR 32:PLOT IP,A-C1:COLOR IC:PL
   OT IP,A:SOUNO 0,124+A,10,12:NEXT A:SOU
   NO 0,0,0,0
XV 1350 COLOR 32:PLOT IP,A-C1:GOTO 109B
VT 1500 0C=92:GOSUB 7B65:FOR X=0 TO 10 ST
   EP 2:SOUNO 2,150,B,X:NEXT X:COLOR 36:P
   LOT XP,YP:FOR X=1B TO 0 STEP -2
IX 1510 SOUNO 2,150,B,X:NEXT X:LOCATE XP,
   YP-C1,C:IF C=32 TXEN COLOR C:PLOT XP,Y
```

continued on next page

```
   P:YP=YP-C1:GOSUB 7065
XO 1520 SOUND 2,0,0,0:GOTO 1110
OA 1530 X=-C1
OG 1535 LOCATE XP+X,YP,C:IF C<>32 THEN X=
   0
YK 1540 COLOR 32:PLOT XP,YP:XP=XP+X:GOSUB
    7065:X=0:RETURN
OP 1550 X=C1:GOTO 1535
KO 1600 FOR X=0 TO 2:SOUND X,0,0,0:NEXT X
   :COLOR 32:PLOT XP,YP
CN 1605 COLOR 61:PLOT 0,22:DRAWTO 10,22:C
   OLOR 41:PLOT 0,21:PLOT 0,20:PLOT 10,21
   :PLOT 10,20:COLOR 161:PLOT 0,19
YU 1610 PLOT 10,19:COLOR 45:PLOT 9,21:FOR
    X=21 TO 15 STEP -C1:COLOR 32:PLOT 0,X
   +C1:DRAWTO 10,X+C1
GF 1620 COLOR 61:PLOT 0,X:DRAWTO 10,X:COL
   OR 45:PLOT 9,X-C1:COLOR 41:PLOT 0,X-2:
   PLOT 10,X-2:COLOR 161:PLOT 0,X-3
XT 1630 PLOT 10,X-3:FOR Y=C1 TO 10:NEXT Y
   :NEXT X:XP=9:YP=X:GOTO 7190
TO 1640 YP=13:OC=42
GC 1645 GOSUB 7020:COLOR 32:PLOT C1,22:DR
   AWTO 10,22:COLOR OI
IZ 1647 PLOT 13+OIC,14:COLOR 42:YP=13:PLO
   T 5+OIC,YP:RESTORE 1700
MZ 1650 FOR XP=6+OIC TO 13+OIC:COLOR 32:P
   LOT XP-C1,13:GOSUB 7065:READ A,0:SOUND
    0,A,10,10:FOR X=C1 TO 0:NEXT X
AZ 1660 FOR X=10 TO 0 STEP -C1:SOUND 0,A,
   10,X:NEXT X:NEXT XP:XP=XP-C1:FOR XX=C1
    TO 9:GOSUB 410:NEXT XX
OO 1670 OC=92:FOR YP=21 TO 0 STEP -C1:COL
   OR 32:PLOT XP,YP+C1:GOSUB 7065:READ A:
   SOUND 0,A,10,10:FOR X=C1 TO 2:NEXT X
XZ 1680 COLOR 36:PLOT XP,YP:FOR X=10 TO 0
    STEP -C1:SOUND 0,A,10,X:NEXT X:NEXT Y
   P:RETURN
GX 1700 DATA 68,50,102,50,76,50,114,100,1
   14,58,76,50,68,50,85,100
WO 1710 DATA 47,243,53,243,96,243,60,243,
   53,243,47,243,60,243
ZN 1800 GOSUB 7020:COLOR 34:PLOT 6,C1:DRA
   WTO 6,9:PLOT 13,C1:DRAWTO 13,9:COLOR 6
   1:PLOT 5,10:DRAWTO 14,10
EZ 1810 DRAWTO 14,12:DRAWTO 5,12:DRAWTO 5
   ,10:POSITION 6,11:? #6;"you win^":POSI
   TION 2,15:? #6;"CONGRATULATIONS^"
PS 1820 IF SCORE>XI THEN 7270
UZ 1830 GOTO 7280
LM 1840 CLR :END
OX 7000 POSITION 3,0:? #6;"PRESS  TRIGGER
   "
GS 7005 POKE 77,0:IF STRIG(0) THEN 7005
AI 7010 RETURN
GT 7020 COLOR 32:FOR X=0 TO 22:PLOT 0,X:D
   RAWTO 19,X:NEXT X:RETURN
OX 7030 COLOR 32:PLOT XP,YP:XP=XP+X:YP=YP
   +Y:GOSUB 7065:SOUND 0,57,10,10:GOSUB 0
   FF:RETURN
TS 7040 COLOR 32:PLOT XP+X,YP+Y:COLOR C:P
   LOT XP+X*2,YP+Y*2:SOUND 0,217,10,10:GO
   SUB OFF:RETURN
GO 7065 COLOR OC:PLOT XP,YP:RETURN
CV 7090 COLOR 59:PLOT XP+X,YP+Y:FOR A=C1
   TO 2:SOUND 0,68,10,4:NEXT A:FOR A=C1 T
   O 2:SOUND 0,85,10,4:NEXT A
IW 7095 GOSUB OFF:SCORE=SCORE+10*(ORO=C1)
   :RETURN
PC 7100 POSITION 2,C1:? #6;SCORE;"=":RETU
   RN
YM 7110 COLOR 170:IF LIVES THEN FOR X=C1
   TO LIVES:PLOT 14+X,C1:NEXT X:COLOR 61:
   PLOT 14+LIVES+C1,C1:RETURN
EJ 7120 COLOR 61:PLOT 15,C1:DRAWTO 17,C1:
   RETURN
ML 7130 IF ORO=C1 THEN POSITION 9,C1:? #6
   ;TIME;"="
AT 7140 RETURN
OX 7150 OONUS=0:POSITION 5,11:? #6;"bonus
    x ";Z:RETURN
OU 7160 COLOR 32:PLOT 2,NM:POSITION 0,NM+
   C1:? #6;" ";CHR$(34);"]":COLOR 61:PLOT
    0,NM+2:DRAWTO 2,NM+2:NM=NM+C1
OF 7170 FOR X=C1 TO 2:SOUND 0,120,10,15:N
   EXT X:GOSUB OFF:RETURN
IN 7180 SOUND 0,X+124,10,10:OONUS=OONUS+Z
   :POSITION 0,13:? #6;OONUS:GOSUB OFF:FO
   R A=C1 TO 25:NEXT A:RETURN
MR 7190 COLOR 45:PLOT XP,YP:RESTORE 7250:
   FOR X=C1 TO 5:READ A,0:SOUND 0,A,12,10
   :FOR Y=C1 TO 0:NEXT Y
WU 7200 FOR Y=10 TO 0 STEP -C1:SOUND 0,A,
   12,Y:NEXT Y:NEXT X:LIVES=LIVES-C1:IF
   NOT LIVES THEN 7260
EG 7210 COLOR 32:PLOT XP,YP:GOSUB 7110:ON
    8RO GOTO 7230,7220,7230
OY 7220 IF NM<19 THEN 850
AO 7230 GOSUB 7020:GOTO 130
JZ 7250 DATA 85,85,76,25,72,25,85,50,60,1
   00
LV 7260 GOSUB 7120:POSITION 4,10:? #6;"en
   d of game":IF SCORE<=HI THEN 7200
OM 7270 A$=STR$(SCORE):POKE 1699,LEN(A$):
   FOR X=C1 TO LEN(A$):POKE 1699+X,VAL(A$
   (X,X)):NEXT X
CK 7200 GOSUB 7000:GOTO 1040
RZ 7290 SOUND 0,0,0,0:RETURN
EJ 7300 TIME=TIME-C1:GOSUB 7130:GOSUB 710
   0:IF  NOT TIME THEN POP :GOTO 7190
AO 7310 RETURN
WJ 10000 RESTORE 10061:C=PEEK(106)-5:BASE
   =(C+C1)*256:POKE 559,0:POKE 106,C:GRAP
   HICS 17
XU 10010 FOR X=C1 TO 32:READ Y:MOVE$(X)=C
   HR$(Y):NEXT X:JUNK=USR(ADR(MOVE$),BASE
   ,57344):POKE 756,BASE/256
AT 10020 TRAP 10060:READ INSET:FOR X=BASE
   +INSET*8 TO BASE+INSET*8+7
EC 10030 READ CHANGE:POKE X,CHANGE:NEXT X
   :GOTO 10020
IO 10060 POKE 559,254:RETURN
TW 10070 DATA 104,104,133,215,104,133,214
   ,104,133,213,104,133,212,162,4,160,0,1
   77,212,145,214,200,208,249
LA 10075 DATA 230,213,230,215,202,208,240
   ,96
JY 10080 DATA 29,170,85,170,85,170,85,170
   ,85,2,24,126,90,66,66,90,126,24,15,0,1
   26,126,126,126,126,126,0
OK 10090 DATA 10,8,20,24,56,56,112,96,152
   ,5,0,126,70,94,94,126,126,0,6,0,126,90
   ,122,122,126,126,0
NF 10100 DATA 7,0,126,126,122,122,98,126,
   0,0,0,126,126,94,94,70,126,0,12,8,20,2
   4,58,62,112,96,152
XE 10110 DATA 13,160,0,12,60,190,127,0,0,
   11,16,40,24,28,28,14,6,25,63,16,40,24,
   92,124,14,6,25
OU 10120 DATA 27,146,84,0,198,0,84,146,0,
   26,254,254,170,138,170,254,254,0,40,12
   4,68,108,56,16,24,16,24
TI 18130 DATA 61,0,0,48,94,116,106,62,0,3
   0,0,12,56,80,96,74,62,0,32,24,60,60,12
   6,126,126,126,60
EK 10140 DATA 3,0,255,126,126,126,255,0,0
PW 10150 DATA 1,124,246,250,254,254,124,5
   6,16,9,16,16,16,16,16,16,16,16,31,104,
   08,104,92,116,56,0,0
OI 10160 DATA 60,0,195,36,24,24,36,0,0,4,
   0,0,0,126,153,36,0,0,42,24,60,36,36,12
   6,126,126,126
UO 10170 DATA 43,16,56,124,124,124,124,25
   4,8,49,112,64,110,72,126,2,14,0,54,60,
   126,90,126,126,126,84,0
HX 10180 DATA 62,12,12,24,24,48,48,0,48
```

bonus game

SCRAMBLE

Article on page 33.

See TYPO II Page 52

LISTING 1

```
GP 10 REM SCRAMBLE
GJ 15 REM BY F. NEIL SIMMS
RG 20 REM ANTIC MAGAZINE
FF 30 GOSUB 5000:GOTO 1000:REM ** init an
   d begin **
RO 30 REM ** time delay loop **
LO 40 IF PEEK(540)<>0 THEN 40
ZV 50 RETURN
PZ 53 REM ** INPUT: string TP$ **
OC 54 REM ** OUTPUT: LN (nonblank LEN(TP$
   )) **
LP 55 FOR K=1 TO 10:IF TP$(K,K)=" " THEN
   LN=K-1:POP :GOTO 65
CN 60 NEXT K:LN=10
AG 65 RETURN
UO 190 REM ** move cursor **
CO 200 TX=X(PLR):TY=Y(PLR):LOCATE TX,TY,Z
   :COLOR Z-32:POKE 53760+I,I*40+40:POKE
   53761+I,160:POKE 77,0
AD 203 IF FIRST(PLR) THEN COLOR Z:FIRST(P
   LR)=0
0L 204 PLOT TX,TY
RS 205 IF ST=14 OR ST=10 OR ST=6 THEN TY=
   TY-1:IF TY<3 THEN TY=7
CT 210 IF ST=9 OR ST=5 OR ST=13 THEN TY=T
   Y+1:IF TY>7 THEN TY=3
MZ 220 IF ST>0 AND ST<12 THEN TX=TX-1:IF
   TX<3+XOFF THEN TX=7+XOFF
ZK 230 IF ST>4 AND ST<0 THEN TX=TX+1:IF T
   X>7+XOFF THEN TX=3+XOFF
PR 250 LOCATE TX,TY,Z:COLOR Z+32:PLOT TX,
   TY:X(PLR)=TX:Y(PLR)=TY
ZK 260 RETURN
GC 390 REM ** mark square or end word **
AA 400 FIRE(PLR)=1
JK 405 WO=WORDS(PLR):TX=X(PLR):TY=Y(PLR):
   LOCATE TX,TY,Z:IF Z>122 THEN 500
TJ 410 IF LT=0 THEN 400:REM ** always mar
   k square if first letter **
ZT 420 IF A0$(PREVX(PLR)-TX)>1 OR A0$(PRE
   VY(PLR)-TY)>1 THEN 600
FX 400 POKE 53760+I,I*60+60:POKE 53761+I,
   160:COLOR Z+120:PLOT TX,TY:PREVX(PLR)=
   TX:PREVY(PLR)=TY
SG 490 T$(TOFF+LT,TOFF+LT)=CHR$(Z-32):IF
   LT<9 THEN LNG(PLR)=LT+1
OO 495 GOTO 600
KY 499 REM ** square was already marked -
    process word if valid **
WM 500 IF WO>99 THEN SOUND PLR,255,10,0:G
   OTO 600:REM ** array full **
UU 505 POKE 53760+I,I*60+60:POKE 53761+I,
   160:IF LNG(PLR)<3 THEN 515:REM ** word
    is too short to count **
AP 510 AOFF=PLR*1000+WO*10:AR$(AOFF+1,AOF
   F+10)=T$(TOFF,TOFF+9):WORDS(PLR)=WO+1
U0 515 T$(TOFF,TOFF+9)=0L$
KH 520 IF  NOT PLR THEN FOR Y=3 TO 7:I=(Y
   -3)*5:POSITION 3,Y:? #6;B$(I+1,I+5):NE
   XT Y:GOTO 540
ES 530 FOR Y=3 TO 7:I=(Y-3)*5:POSITION 12
   ,10-Y:? #6;0$(I+1,I+5):NEXT Y
US 540 LNG(PLR)=0:POKE 87,1:POSITION 1+15
   *PLR,11:? #6;WORD$(PLR);
UY 550 LOCATE TX,TY,Z:COLOR 2+32:PLOT TX,
   TY
ZC 600 RETURN
ZJ 990 REM ** main play loop **
AE 1000 POKE 53761+PLR*2,0
MI 1002 IF STRIG(0) AND FIRE(0) THEN FIRE
   (0)=0
PO 1003 IF STRIG(1) AND FIRE(1) THEN FIRE
   (1)=0
FW 1004 IF PEEK(542)<>0 THEN 1002
OX 1005 POKE 542,5:PLR= NOT PLR:XOFF=9*PL
   R:TOFF=10*PLR+1:LT=LNG(PLR):WO=WORDS(P
   LR):I=PLR*2:POKE 07,2
FM 1010 ST=STICK(PLR):IF ST<>15 THEN GOSU
   B 200:GOTO 1030
ZO 1020 T=STRIG(PLR):IF  NOT T AND  NOT F
   IRE(PLR) THEN GOSUB 400
EH 1029 REM ** update TIME **
KE 1038 TI=PEEK(540):IF TI THEN 1050
YW 1035 TIME=TIME-1
HI 1040 POKE 540,60:POKE 07,1:POSITION 9,
   11:? #6;TIME;"  ":IF  NOT TIME THEN 12
   00
HS 1050 GOTO 1000:REM ** end of main loop
    **
SA 1190 REM ** end of round **
NL 1200 GOSUB 2700:FOR I=10 TO 0 STEP -0.
   3:POKE 53279,0:POKE 540,I:GOSUB 40:NEX
   T I
OT 1205 POKE 07,2:POSITION 5,0:? #6;"dupl
   icates:":FOR L=0 TO 1
GH 1210 IF WORDS(L)>1 THEN PLR=L:GOSUB 30
   00
GG 1220 NEXT L
GI 1230 IF WORDS(0)<1 OR WORDS(1)<1 THEN
   1240
LL 1235 GOSUB 2000:POSITION 5,0:? #6;" ma
   tches:  ":GOSUB 3300
PA 1240 GOSUB 2000:POSITION 1,9:? #6;"acc
   ept < > reject"
YK 1250 POSITION 5,0:? #6;" SCORING:  ":F
   OR L=0 TO 1:PLR=L:GOSUB 3500:NEXT L
UI 1260 POSITION 0,0:FOR I=0 TO 9:? #6;0L
   $;0L$;:NEXT I:POSITION 1,4:? #6;"[illegible]":POKE 540,200:GOSUB 40
PW 1270 IF SCORE(0)<WIN AND SCORE(1)<WIN
   THEN 1300:REM ** skip following if not
    end of game **
PK 1200 IF SCORE(0)>SCORE(1) THEN WINNER=
   0:GOTO 1295
CT 1205 IF SCORE(0)=SCORE(1) THEN 1297
WM 1290 WINNER=1
YF 1295 POSITION 2,6:? #6;"player #";WINN
   ER+1;" wins!":GOTO 1290
LJ 1297 POSITION 5,6:? #6;"it's a tie!"
RY 1290 FOR I=50 TO 250 STEP 3:POKE 540,0
   :GOSUB 40:SOUND 0,I,10,6:SOUND 1,300-I
   ,10,6:NEXT I:GOSUB 2700:GOTO 1500
OC 1300 GOSUB 4000:GOSUB 2000:GOSUB 2500:
   ROUND=ROUND+1:POKE 07,1:POSITION 13-1*
   (ROUND>9),13:? #6;ROUND;:GOSUB 2600
ZA 1340 GOTO 1000:REM ** start next round
    **
```

continued on next page

```
OJ 1500 GOSUB 2600:GOSUB 5000:GOTO 1000:R
   EM ** end of game - restart **
WA 1990 REM ** display letter grid **
ZO 2000 POKE 87,2:? #6;CHR$(125):POSITION
    6,0:? #6;;"■CR■■bL■"
RX 2005 FOR I=1 TO 25:C=INT(PEEK(RANDOM)*
   96/256)+1:B$(I,I)=L$(C,C):NEXT I
KK 2010 FOR Y=3 TO 7:I=(Y-3)*5:POSITION 3
   ,Y:? #6;B$(I+1,I+5):POSITION 12,10-Y:?
    #6;B$(I+1,I+5):NEHT Y
UB 2039 REM ** border **
WF 2040 FOR Y=2 TO 8 STEP 6:FOR H=2 TO 8:
   POSITION X,Y:? #6;"■":POSITION H+9,Y:?
    #6;"■":NEXT X:NEXT Y
WO 2050 FOR X=2 TO 8 STEP 6:FOR Y=3 TO 7:
   POSITION X,Y:? #6;"■":POSITION X+9,Y:?
    #6;"■":NEHT Y:NEHT X
OC 2060 FOR I=0 TO 1:PLR=I:HOFF=9*PLR:GOS
   UB 200:NEXT I
AC 2100 RETURN
YF 2490 REM ** build scoring window **
LL 2500 POKE 87,1:FOR I=0 TO 15 STEP 15:P
   OSITION I,10:? #6;"WORDS";
NN 2510 POSITION I+1,11:? #6;"0   ";:POSIT
   ION I,12:? #6;"■■■■■";:POSITION I+1,13
   :? #6;SCORE(I-14*(I=15));:NEXT I
OO 2515 SOUND 0,120,10,0:POKE 540,10:GOSU
   B 40:GOSUB 2700
OU 2520 POSITION 0,10:? #6;"■■■■■":POSITIO
   N 9,11:? #6;"200":POSITION 6,13:? #6;"
   round:  ";
AZ 2550 RETURN
PL 2590 REM ** "go on" prompt **
JZ 2600 POKE 87,2:POSITION 0,9:? #6;"pres
   s ■■■■ to go on":IF PEEK(53279)=6 THEN
    POP :GOSUB 5000:GOTO 1000
VK 2610 IF STRIG(0) AND STRIG(1) THEN POS
   ITION 6,9:? #6;"FIRE":GOTO 2600
XB 2620 IF  NOT STRIG(0) OR  NOT STRIG(1)
    THEN 2620
GB 2630 POSITION 0,1:? #6;BL$;BL$:POSITIO
   N 0,9:? #6;BL$;BL$:RETURN
OB 2690 REM ** turn off sound **
FB 2700 POKE 53761,0:POKE 53763,0:RETURN
PR 2790 REM ** 4 clicks **
MG 2800 FOR I=1 TO 4:POKE 540,5:POKE 5327
   9,0:GOSUB 40:NEXT I:RETURN
CF 2990 REM ** find and delete dups **
IP 3000 FOR I=1+1000*PLR TO WORDS(PLR)*10
   -19+1000*PLR STEP 10:TP$=AR$(I,I+9):DU
   P=0:POKE 53279,0
IU 3020 IF TP$=BL$ THEN 3060
SZ 3025 FOR J=I+10 TO WORDS(PLR)*10-19+10
   00*PLR STEP 10
UU 3030 IF TP$<>AR$(J,J+9) THEN 3055
OK 3035 IF PEEK(540)<>0 AND  NOT DUP THEN
    3035
OR 3037 IF  NOT STRIG(0) OR  NOT STRIG(1)
    THEN 3037
XM 3040 AR$(J,J+9)=BL$:IF  NOT DUP THEN P
   OSITION 0+10*PLR,1:? #6;TP$:POKE 540,1
   20:DUP=1
GL 3055 NEHT J
FJ 3060 NEHT I
NA 3070 POKE 540,120:GOSUB 40:POSITION 0+
   10*PLR,1:? #6;BL$:RETURN
CO 3298 REM ** find matches and eliminate
    **
DK 3300 FOR I=1 TO WORDS(0)*10-9 STEP 10:
   TP$=AR$(I,I+9):POKE 53279,0:IF TP$=BL$
    THEN 3300
SX 3325 FOR J=1001 TO WORDS(1)*10-9+1000
   STEP 10
BB 3330 IF TP$<>AR$(J,J+9) THEN 3375
YF 3340 GOSUB 40:IF  NOT STRIG(0) OR  NOT
    STRIG(1) THEN 3340
WP 3350 AR$(J,J+9)=BL$:AR$(I,I+9)=BL$:POS
   ITION 0,1:? #6;TP$:POKE 540,100:POP :G
   OTO 3300
GH 3375 NEXT J
FV 3300 NEXT I
YY 3390 GOSUB 40:POSITION 5,1:? #6;BL$:RE
   TURN
ZC 3490 REM ** let players review words *
   *
MF 3500 NONE=1:FOR I=1+1000*PLR TO WORDS(
   PLR)*10-9+1000*PLR STEP 10:TP$=AR$(I,I
   +9):IF TP$=BL$ THEN 3600
AC 3530 POSITION 0+10*PLR,1:? #6;BL$:FOR
   N=1 TO 10:POSITION 10+10*PLR-N,1:? #6;
   TP$(1,N):NEHT N:NONE=0
NU 3540 S1=STICK(0):S2=STICK(1):POKE 540,
   20
TL 3550 IF S1<>7 AND S2<>7 THEN 3560
BZ 3555 POSITION 12,9:? #6;"■■■■■■■":SOUND
    0,200,12,6:GOSUB 40:POSITION 12,9:? #
   6;"reject":GOTO 3590
SM 3560 IF S1<>11 AND S2<>11 THEN 3540
KR 3565 POSITION 1,9:? #6;"■■■■■■■":SOUND
   0,100,8,6:GOSUB 55:AOO=1*(LN<5)+(LN=3)
   *(LN>=5)
PV 3570 SCORE(PLR)=SCORE(PLR)+AOO:POKE 87
   ,1:POSITION 1+15*PLR,13:? #6;SCORE(PLR
   );:POKE 87,2
NV 3580 GOSUB 40:POSITION 1,9:? #6;"accep
   t"
KL 3590 IF  NOT STRIG(0) OR  NOT STRIG(1)
    THEN 3590
QG 3600 GOSUB 2700:GOSUB 40:NEHT I
GA 3605 IF NONE THEN POSITION 1+10*PLR,1:
   ? #6;"no words":POKE 540,200:GOSUB 40
AU 3610 POSITION 0+10*PLR,1:? #6;BL$:RETU
   RN
GY 3990 REM ** initialize var's **
BK 4000 AR$=" ":AR$(2000)=AR$:AR$(2)=AR$:
   T$=AR$:FOR I=0 TO 1:LNG(I)=0:WORDS(I)=
   0:FIRST(I)=1:NEHT I
SL 4010 H(0)=3:H(1)=12:Y(0)=3:Y(1)=3:TIME
   =200
AR 4050 RETURN
RJ 4990 REM ** initialize **
EI 5000 GRAPHICS 2:OL=PEEK(560)+256*PEEK(
   561):WIN=50:RANDOM=53770:SETCOLOR 4,6,
   2:GOAL=50
SH 5030 FOR I=15 TO 10:POKE OL+I,6:NEXT I
JX 5040 POKE OL+19,65:POKE OL+20,PEEK(560
   ):POKE OL+21,PEEK(561)
ZK 5060 DIM AR$(2000),T$(20),LNG(1),WORDS
   (1),X(1),Y(1),PREVX(1),PREVY(1),B$(25)
   ,L$(96),BL$(10),TP$(10),SCORE(1)
MP 5070 DIM FIRST(1),FIRE(1)
OG 5075 L$="AAAAAAAABBBCCCDDDEEEEEEEEEEF
   FGGGHXXIIIIIIIIJKKLLLLLLMMMNNNNNOOOOOOPP
   PQRRRRSSSSSTTTTTUUUUVVWWHYYYZ"
SU 5080 GOSUB 4000:BL$=T$:SCORE(0)=0:SCOR
   E(1)=0
FJ 5100 GOSUB 2000:GOSUB 2500:ROUND=1:POK
   E 87,1:POSITION 13,13:? #6;ROUND;:POSI
   TION 1,13:? #6;"0   ";:POSITION 16,13
IE 5110 ? #6;"0   ";:POKE 87,2
CJ 5120 POKE 540,15:POSITION 2,9:? #6;"se
   lect GOAL: ";GOAL;" ";
VZ 5130 POSITION 0,1:? #6;"press ■■■■■ to
    begin";:GOSUB 40
OO 5140 N=PEEK(53279):IF N=6 THEN 5170
OV 5150 IF N=5 THEN GOAL=GOAL+50:IF GOAL>
   200 THEN GOAL=50:POSITION 15,9:? #6;GO
   AL;" ";
JX 5160 POSITION 2,9:? #6;"■■■■■■■":POSITI
   ON 6,1:? #6;"start":POKE 540,15:GOSUB
   40:GOTO 5120
WN 5170 POSITION 0,1:? #6;BL$;BL$:POSITIO
   N 0,9:? #6;BL$;BL$:WIN=GOAL
AH 5200 RETURN
```

bold letters beef up graphics 0

WIDE TEXT

Article on page 34

See TYPO II Page 52

LISTING 1

```
VE 10 REM WIDETEXT.BAS
YY 20 REM BY BILL MORRIS
RH 30 REM ANTIC MAGAZINE
XW 40 GOSUB 20000:POKE 710,144
HL 50 CLR :DIM A$(40)
LK 60 ? "K":? :?
XP 70 ? "  g\r-a+P+h/i .c4 54 1 & GRAPHICS
   D":? :?
RL 80 ? "                    BY":?
ZP 90 ? :? "        b [i .I" I"  M~o. r-r-1 .54"
CR 100 X=USR(1536)
UI 110 GOSUB 7300
HD 120 POKE 712,0
PO 130 ? :? " WIDETEXT IS A BASIC PROGRAM
    THAT"
QM 140 ? "USES A LITTLE MACHINE LANGUAGE
   TO"
WX 150 ? "CREATE A GR.1 CHARACTER SET THA
   T"
XL 160 ? "USES A DIFFERENT SET OF RULES:"
PB 170 ? :? "1.THEY CAN GO ANYWHERE ON TH
   E SCREEN"
MT 180 ? "2.THE COLOR MATCHES THE GR.0 TE
   XT."
AC 190 ? "3.THE BACKGROUND STAYS INTACT."
JN 200 ? "4.INVERSE VIDEO WORKS."
JR 210 ? "5.EACH WIDE LETTER IS PRINTED W
   ITH 2"
NK 220 ? "  KEYSTROKES: LOWER CASE A + CO
   NTROL"
K8 230 ? "  A GIVE US A WIDE A."
UP 240 GOSUB 7300
OO 250 ? "  TO GET USER INPUT, OF COURSE,
    WE"
OE 260 ? "CAN'T EXPECT A USER OF OUR PROG
   RAMS"
CV 270 ? "TO INPUT ANYTHING REQUIRING 2 S
   TROKES"
OL 280 ? "PER LETTER. HERE IS A ROUTINE T
   HAT"
MV 290 ? "GETS AS IN THE PROGRAM'S CHOICE
    OF"
CA 300 ? "WIDE OR NORMAL CHARACTORS"
UK 310 GOSUB 7300
OG 320 LIST 6000,6090:LIST 6400,6600
UO 330 GOSUB 7300
TV 340 GOSUB 6020
OC 350 END
OT 6000 REM Wri.dden INPUT,NORMAL INPUT
VH 6010 DIM A$(40)
EY 6020 OPEN #1,4,0,"K:"
WQ 6030 ? "YOUR FAVORITE COMPUTER?"
KU 6040 WIDE=0:GOSUB 6400
FH 6050 OPEN #1,4,0,"K:"
MN 6060 ? "YOUR FAVORITE MAGAZINE?"
JA 6070 A$(1)=" ":A$(40)=A$:A$(2)=A$
LR 6080 WIDE=1:GOSUB 6400
OF 6090 RETURN
RP 6400 REM *** INPUT ROUTINE***
ZC 6410 X=1
KU 6420 GET #1,R
XJ 6430 IF R=155 THEN 6510
YK 6440 IF WIDE=0 THEN 6480
NF 6450 IF R=32 THEN ? "  ";:GOTO 6490
CL 6460 L=R+32:? CHR$(L);
MV 6470 C=R-64:? CHR$(C);:GOTO 6490
XD 6480 ? CHR$(R);
AA 6490 A$(X,X)=CHR$(R)
GW 6500 X=X+1:GOTO 6420
AH 6510 ? :? A$:CLOSE #1:RETURN
AU 6520 RETURN
EU 7300 POSITION 2,22
GM 7310 ? "  PRESS [illegible] TO
    CONT."
FF 7320 OPEN #1,4,0,"K:"
KW 7330 GET #1,R
NH 7340 CLOSE #1
LR 7350 ? "K"
80 7360 RETURN
SL 20000 FOR A=1536 TO 1702:READ 8:POKE A
   ,8:NEXT A:RETURN
ZQ 20010 DATA 104,169,0,133,69,133
FY 20020 DATA 204,133,206,133,71,56
SY 20030 DATA 165,89,233,1,133,72
FJ 20040 DATA 233,1,133,207,233,1
NT 20050 DATA 133,205,233,1,133,70
LS 20060 DATA 160,0,185,0,224,145
YY 20070 DATA 69,105,0,225,145,204
WI 20080 DATA 141,254,6,74,74,74
FL 20090 DATA 74,141,255,6,173,254
AW 20100 DATA 6,41,15,32,186,6
ZH 20110 DATA 145,206,173,255,6,32
UR 20120 DATA 186,6,145,71,200,192
OI 20130 DATA 208,208,213,185,0,224
OR 20140 DATA 145,69,185,0,225,145
FT 20150 DATA 204,185,0,226,145,206
SI 20160 DATA 185,0,227,145,71,200
WD 20170 DATA 192,255,208,231,165,70
OG 20180 DATA 141,244,2,96,17D,41
NU 20190 DATA 8,201,8,208,7,138
RA 20200 DATA 24,105,184,76,121,6
AK 20210 DATA 138,170,41,4,201,4
RO 20220 DATA 208,7,138,24,105,44
TJ 20230 DATA 76,136,6,138,170,41
GF 20240 DATA 2,201,2,208,7,138
HP 20250 DATA 24,105,10,76,151,6
VE 20260 DATA 138,17D,41,1,201,1
HR 20270 DATA 208,7,138,24,105,2
SH 20280 DATA 76,166,6,138,96,0
```

LISTING 2

```
0100 ;   Wri.dden letetoer-s+
0110 ;     BY BILL MORRIS
0120 ;
0130 ONECHAR =$6FE ;  TEMPORARY
0140 HALFCHAR =$6FF ;  HOLDERS
0150 CHBAS =$2F4 ; CHAR SET POINTER
0160 NUMBERS =$45 ; BORROWED FROM DUP
0170 CAPS =$CC    ; SAFE FROM BASIC
0180 CONTROL =$CE
0190 LOWER =$47 ;ALSO BELONGS TO DUP
0200  *=$0600
0210  PLA     ; SETUP RETURN TO BASIC
0220 ; LD BYTE OF PAGE # VARIABLES =0
0230  LDA #0
0240  STA $45 ; LO BYTE NUMBERS AOR
0250  STA $CC ; LO BYTE CAPS AOR
0260  STA $CE ; LO BYTE CONTROL CHARS
```

continued on page 42

```
0270  STA $47 ; LD 0YTE LDWER CASE
0280  SEC
0290  LDA $59 ; PAGE # SCREEN MEMORY
0300  S0C #1
0310  STA $40 ; PAGE # LDWER CASE
0320  S0C #1
0330  STA $CF ; PAGE # CDNTRDL CHARS
0340  S0C #1
0350  STA $C0 ; PAGE # CAPS
0360  S0C #1
0370  STA $46 ; PAGE # NUM0ERS
0380  LDY #0  ; SET CDUNTER
0390 ;  0EGIN SPREA0ING LETTERS,
0400 ;ONE 0YTE AT A TIME
0410 START LOA $E000,Y ; CDPY NUM0ERS
0420  STA (NUM0ERS),Y ; STORE THEM
0430  LDA $E100,Y  ; CDPY CAPS
0440  STA (CAPS),Y ; STORE UNCHANGE0
0450  STA ONECHAR ; MAKE EXTRA CDPY
0460  LSR A     ; SHIFT LEFT
0470  LSR A     ; NY00LE INTD
0480  LSR A     ; RIGHT NY00LE,LEAVING
0490  LSR A     ; LEFT NY00LE EMPTY
0500  STA HALFCHAR ; FILE IT AWAY
051D  LOA ONECHAR ; THAT EXTRA COPY
0520  ANO #$0F     ; KILL LEFT NY00LE
0530  JSR 0IT3  ; SPREAD RIGHT NY00LE
0540  STA (CONTROL),Y ; STORE RIGHT
0550 ;  HALF OF NEW LETTER
0560  LDA HALFCHAR ; GET OTHER HALF
0570  JSR 0IT3 ; SPREAD IT
0580  STA (LOWER),Y ; STORE LEFT HALF
0590  INY ;COUNTER = CDUNTER +1
D600  CPY #26*0 ; 0 0YTES TD A LETTER
0610 ;       26 LETTERS TO AN ALPHA0ET
0620  0NE START ; NEXT Y
0630 FINISH LOA $E000,Y ;STORE
0640  STA (NUM0ERS),Y    ;MISC.
0650  LOA $E100,Y        ;CHARACTERS
0660  STA (CAPS),Y       ;UNCHANGE0
0670  LOA $E200,Y
0680  STA (CONTROL),Y
0690  LDA $E300,Y
0700  STA (LOWER),Y
0710  INY
0720  CPY #$FF        ; DONE
0730  0NE FINISH
0740  LOA $46    ; FIRST PAGE # NEW SET
0750  STA CH0AS ; POKED INTO POINTER
0760  RTS ; RETURN TO 0ASIC, 0YE 0YE
0770 ;
0700 ;  SU0ROUTINE TD SPREA0 HALF
0790 ;  A 0ITE INTO THE FULL 0YTE
0000 ;
0010 0IT3 TAX ; SAVE A COPY
0020  AND #8  ; SEE IF 0IT 3 IS ON
0030  CMP #0  ;    00001000
0040  0NE 0IT2; IF NDT GOTD 0IT2
0050  TXA     ; GET THE CDPY
0060  CLC     ;
0070  ADC #$00; 0IT 3 OFF, 6 & 7 ON
0000 ;            11000000
0090  JMP CLR2 ; 0YPASS NEXT LINE
0900 0IT2 TXA ; GET UNALTERE0 COPY
0910 CLR2 TAX ; STASH LATEST VERSIDN

0920  AND #4  ; SEE IF 0IT 2 IS ON
0930  CMP #4  ;    00000100
0940  0NE 0IT1; IF NOT, THEN 0IT1
0950  TXA
0960  CLC
0970  A0C #$2C  IF SO, 0D THIS
0900  JMP CLR1;    00110000
0990 0IT1 TXA
1000 CLR1 TAX
1010  AND #2     ; 0IT 1?
1020  CMP #2     ; 00000010
1030  0NE 0IT0
1040  TXA
1050  CLC
1060  ADC #$0A  ; 0ECOMES
1D70  JMP CLR0  ; 00001100
1000 0ITD TXA
1090 CLR0 TAX
11D0  ANO #1    ; 00000001
1110  CMP #1
1120  0NE 0IT06
1130  TXA
1140  CLC
1150  ADC #$02  ; 00000011
1160  JMP CLR06
1170 0IT06 TXA
1100 CLR06 RTS  ; RETURN
```

LISTING 3

```
HE 10 REM PEEKER
YY 20 REM 0Y 0ILL MORRIS
RH 30 REM ANTIC MAGAZINE
0X 40 X=2D010:REM 0ATA STATEMENTS WILL ST
   ART WITH THIS LINE NUM0ER
NM 50 FOR A=1536 TO 1701 STEP 6
OX 60 ? CHR$(125):PDSITION 2,6
VE 70 ? X;" DATA ";
SO 00 ? PEEK(A);",";
FJ 90 ? PEEK(A+1);",";
TH 100 ? PEEK(A+2);",";
TX 11D ? PEEK(A+3);",";
UN 120 ? PEEK(A+4);",";
RX 130 ? PEEK(A+5)
GW 140 POSITION 2,0:POKE 042,13:PDSITIDN
   2,7:? "CDNT"
FX 150 POSITION 2,4:STDP
MM 160 POKE 042,12
PY 170 X=X+10
DF 100 NEXT A
DI 190 ENO
```


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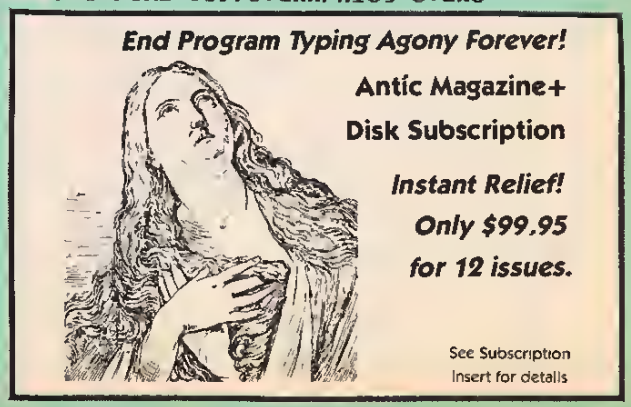
TOUCH TABLET CURSOR

Article on page 36

See TYPO II Page 52

LISTING 1

```
YU 10 REM KOALA CURSOR DEMONSTRATION
0X 20 REM 0Y KARL E. WIEGERS
RH 30 REM ANTIC MAGAZINE
EH 40 AD=1593:REM AD=1596 FOR ATARI TOUCH
    TABLET.
OZ 50 DATA 104,169,7,162,6,160,10,76,92,2
   20,173,112,2,141,0,200,160
MA 60 DATA 6,169,0,145,205,136,16,251,173
   ,113,2,133,205,160,0,177,203
AL 70 REM 60 DATA 6,169,0,145,205,136,16,
   251,169,220,56,237,113,2,133,205,160,0
   ,177,203
IR 80 REM FOR TOUCH TABLET, USE THE ABOVE
    DATA LINE IN PLACE OF LINE 60.
VE 90 DATA 145,205,200,192,7,208,247,165,
   20,201,4,208,7,206,192,2,169
IT 100 DATA 0,133,20,76,98,220,104,160,98
   ,162,220,169,7,76,92,220
RR 110 REM RESERVE 8 PAGES OF RAM FOR PM
   GRAPHICS
0Y 120 RAMTOP=PEEK(106)-8
HM 130 PMBASE=RAMTOP*256
OH 140 POKE 106,RAMTOP-4
YX 150 GRAPHICS 17
MS 160 POKE 54279,RAMTOP
LR 170 POKE 559,0
0X 180 REM LOAD VERTICAL BLANK INTERRUPT
   ROUTINE INTO PAGE 6
KN 190 FOR I=1 TO (AD-1526):READ A:POKE 1
   535+I,A:NEXT I
FO 200 FOR I=PMBASE+1024 TO PMBASE+1279:P
   OKE I,0:NEXT I
SV 210 POKE 203,0:POKE 204,RAMTOP
GW 220 POKE 205,0:POKE 206,RAMTOP+4
RV 230 REM LOAD PLAYER DATA
YL 240 FOR I=0 TO 6:READ A:POKE PMBASE+I,
   A:NEXT I
VC 250 DATA 120,64,32,20,12,30,6
ZA 260 GRAPHICS 17
HM 270 POSITION 4,1:? #6;"*** MENU ***"
JK 280 POSITION 5,5:? #6;"menu item 1"
WM 290 POSITION 5,7:? #6;"menu item 2"
IR 300 POSITION 5,9:? #6;"MENU ITEM 3"
CJ 310 POSITION 0,11:? #6;"QUIT"
0V 320 REM TURN ON PMG AND INITIALIZE TIM
   ER
RN 330 POKE 559,62
VM 340 POKE 53277,3
EM 350 POKE 20,0
AO 360 REM TURN ON VBI ROUTINE. TO TURN I
   T OFF, USE A=USR(AD)
YW 370 A=USR(1536)
OZ 380 FOR I=1 TO 100:NEXT I
EA 390 IF STICK(0)=15 THEN 390
NZ 400 IF PEEK(205)>63 AND PEEK(205)<74 T
   HEN GOTO 450
MM 410 IF PEEK(205)>79 AND PEEK(205)<90 T
   HEN GOTO 520
TS 420 IF PEEK(205)>95 AND PEEK(205)<106
   THEN GOTO 600
KK 430 IF PEEK(205)>111 AND PEEK(205)<122
    THEN GOTO 750
OG 440 GOTO 390
VH 450 GRAPHICS 10:POKE 559,62:POKE 53240
   ,0
GW 460 A=USR(AD)
PW 470 POSITION 4,3:? #6;"AT OPTION ONE"
CO 480 POSITION 2,7:? #6;"PRESS BUTTON FO
   R":? #6;"        MENU"
PC 490 FOR I=1 TO 100:NEXT I
WI 500 IF STICK(0)=15 THEN 500
OK 510 GOTO 260
PI 520 GRAPHICS 2:POKE 559,62:POKE 752,1
LV 530 POKE 700,00:POKE 709,0:POKE 710,19
   8
RZ 540 POSITION 6,2:? #6;"7 + 5 = ?"
FA 550 POSITION 4,6:? #6;"10  12  2  16"
XW 560 ? " Point to answer and press butt
   on"
OW 570 IF STICK(0)=15 THEN 570
OL 580 LM=16050-10*AD
RF 590 IF PEEK(625)<LM OR PEEK(625)>LM+17
    THEN 570
PG 600 IF PEEK(624)>99 AND PEEK(624)<121
   THEN GOTO 620:REM PADDLE(0)
WP 610 POSITION 3,0:? #6;"SORRY-TRY AGAIN
   ":FOR I=1 TO 50:NEXT I:GOTO 570
UV 620 POSITION 3,0:? #6;"   CORRECT!!
   "
RM 630 POSITION 14,2:? #6;"12"
WW 640 ? "K      PRESS BUTTON FOR MENU"
OW 650 FOR I=1 TO 100:NEXT I
OU 660 IF STICK(0)=15 THEN 660
0X 670 GOTO 260
VP 680 GRAPHICS 10:POKE 559,62:POKE 53240
   ,0
HC 690 A=USR(AD)
ZA 700 POSITION 3,3:? #6;"AT OPTION THREE
   "
CF 710 POSITION 2,7:? #6;"PRESS BUTTON FO
   R":? #6;"        MENU"
OR 720 FOR I=1 TO 100:NEXT I
80 730 IF STICK(0)=15 THEN 730
OS 740 GOTO 260
OZ 750 POKE 53240,0:A=USR(AD)
XK 760 POKE 106,PEEK(106)+12
ZK 770 POKE 559,3:GRAPHICS 0:END
```

DISKIO

Article on page 40.

LISTING 1

```
OL 1 REM DISKIO VERSION 4.3 -- BY BERNARD
    OPPENHEIM.  ANTIC, JANUARY,1985.  PUB
   LIC DOMAIN.  REQUIRES DOS 2.0S.
XN 2 DIM DAT$(114),CH$(2):K32=32768:IF PE
   EK(1693)=255 THEN 10
EN 3 FOR I=1 TO 158:READ X:POKE 1535+I,X:
   NEXT I
NV 4 DATA 104,104,184,133,205,104,104,178
   ,104,133,204,104,133,203,24,165,203,10
   1,285,133,203,144,2,230,204,168
NC 5 DATA 0,177,283,133,212,200,177,203,1
   33,213,48,72,232,228,212,240,10,134,21
   2,165,213,9,128,133,213,208,57
KS 6 DATA 200,177,203,133,205,56,233,3,13
   3,206,169,0,168,74,144,2,9,128,81,203,
   280,196,206,144,244,133,287,74,74
DD 7 DATA 74,74,201,10,144,3,24,1D5,7,105
   ,48,209,203,288,13,280,200,196,205,240
   ,167,136,165,207,41,15,16,230,96
XL 8 DATA 184,104,133,204,104,133,203,160
   ,D,132,213,177,203,56,233,48,201,10,14
   4,2,233,7,10,10,10,10,133,212
PT 9 DATA 208,177,203,56,233,48,281,18,14
   4,2,233,7,24,101,212,133,212,96,0
PJ 10 GOSUB 19:LN=USR(1536,LEN0,LINE0,ADR
   0):IF LN<K32 THEN POKE 1693,255:LIST L
   N:END
2K 11 IF LN>K32 THEN POKE 1693,255:LN=LN-
   K32:? "LINE ";LN;" IS MISSING":END
8M 12 ? "READY TO CREATE AUTORUN.SYS FILE
   ?";:CLOSE #1:OPEN #1,4,0,"K:":GET #1,X
   :IF X<>89 THEN END
RW 13 CLOSE #1:OPEN #1,8,0,"D:AUTORUN.SYS
   ":RESTORE 20:CHADR=ADR(CH$):TRAP 18
DD 14 READ DAT$:L=LEN(DAT$)-2:IF ASC(DAT$
   )>47 THEN IF ASC(DAT$)<71 THEN 17

GO 15 FOR I=1 TO L:CH$=DAT$(I):X=ASC(CH$)
   :IF X=33 THEN X=155
XD 16 PUT #1,X:NEXT I:GOTO 14
82 17 FOR I=1 TO L STEP 2:CH$=DAT$(I):X=U
   SR(1647,CHADR):PUT #1,X:NEXT I:GOTO 14
YK 18 CLOSE #1:END
VS 19 ADR0=PEEK(138)+256*PEEK(139):LINE0=
   PEEK(ADR0):LEN0=PEEK(ADR8+2):RETURN
WD 20 DATA FFFF0C1D342968AD01A0C9CAF009C9
   88D06EA9238DF71DA58C8D4A1EA50D8D4849
MD 21 DATA 1EA949850CA91E858DA9F9A2262061
   26A0248888888891A83C945D0F68918038S6A
TD 22 DATA C8A9FC991883891C0385CCA91C991C
   03A08F81C899FC1C8818F8A9868D001DA91E
WH 23 DATA 1D8D011D18A00481C869018D881DC8
   81C869008D891DA9358DE702A9298DE802EC
RU 24 DATA 60203EF688C998F005EEF91D286898
   488A48A20685C848CA18FAADF91DF0378516
KU 25 DATA CDA9888DF91D85D08DFE82ADF202F0
   268AADF61DD0838EF61DECF61DD075A96493
SI 26 DATA 85C8A91E85CCD00320F81DA0FFC8C4
   CDF8F681C8C9FFF058297FD98805D0E9810D
IR 27 DATA C810EAC884CE81C848C881C8486880
   8080223188C881C818F8981869034C3D2282
FF 28 DATA A00884D0A92E998005C884CD84CEA9
   22CDF71DF088A95585C8A91E85CC4CA52073
DS 29 DATA A5D8D8DCA9801865CD8524A9858525
   A9858522A2F96895D2E830FA68AA68A8A9AA
L2 30 DATA 98286028481528271DA9088DF91D68
   FF585846494E442F4026252F811E25444986
AK 31 DATA D21F362EC4216344454CAE20A44445
   4C4554C520712EC821654C4F43C820752E68
WW 32 DATA D52165554EAE20A4554E4C4F43C820
   792ECE21635245AE28A452454E414DC52015
TF 33 DATA 7D48494CCC20972EC5216545AE28A4
   454E5445D220E32ECC21654C4FAE20A44CAF
DA 34 DATA 4F41C420E32ED2216552554EC4215A
   2ED3216353AE28A4534156C520E32ED82166
SK 35 DATA 634C49AE28A44C495354C4215A4CAE
   28A44C4953D41E252EC22165424CAE28A4D0
DH 36 DATA 424C4F41C4260648454C002683464F
   524D41D425192ECD21634DAE20A44D4F5658
DM 37 DATA C523E657444FD3249EFF44313A2A2E
   2A98208419A9028552A931A004C4CDD803DA
SR 38 DATA AD83058DF81D8D311FA086A93048A9
   1F48A90320D6259810834C8C23206722A938
NK 39 DATA 808DEE0585D1A97D8DC685A91D8DC7
   05A9988DC805A9C648A90548A028A909A2A9
AO 40 DATA 0020D625ADEE05D010A91C8DC6858D
   C705A9988DC8052056E4207C22A228F81878
CD 41 DATA A5D1690185D1D82981F00AA9C685C8
   A90585CCD008A9DA85C8A90585CCA5C8488F
AL 42 DATA A5CC48A014A98528D6259818062884
   194C061EEEEE05A00DA928D1C8D897CEEE8C
DY 43 DATA 05A0128881C8C891C888D0F7C881C8
   C891C8A000A5D129F0D086A92091C8D08968
CV 44 DATA 4A4A4A4A18693891C8C8A5D1290F18
   693091C84A90C6A9208DD8058DD9054CA23A
NR 45 DATA 1F282D204C061E8DEF05A4CE20EF20
   20C324A5D0F80568684C061EE6CEA220A944
PP 46 DATA 00A4CD9988053898E5CEA818A98065
   CE48A9056900848ADEF05C903D082A0042052
MK 47 DATA D6259810066868984C8C2360A921D0
   81A923D0ADA924D0A9A4CE20EF282856252C
8D 48 DATA F00530074C061EA920D096A90085D0
   4C261EAD4A1E850CA0481E850D4C74E4A008
AG 49 DATA 0020F81DA4CE8881C8297F99880581
   C83008C820C820E6CE10E0C881C848C88118
PV 50 DATA C848A4CE608CF805E6CDA4CD888980
   05998105CCF005D8F4A92099880560A4CEA5
EK 51 DATA 20EF2020C3244C261E283321ADF71D
   D98005D013C8C8A93AD98005D02F20C82030
XD 52 DATA A931998005D02528C820ADF71D9980
   05C820C820A944998005C828C820ADF81DC5
DF 53 DATA 998005C820C820A93A998805608980
   05C920D020C4CDF81CC6CD8CF00589818562
UE 54 DATA 998005C4CDF803C818F3A920998105
   ACF00510D960A4CEA920997F05D080E6D0D8
CW 55 DATA A5CDC902F864AD8205C930305DC93A
   105938E920C910D802A9008DF105AD83059A
88 56 DATA 38E9288DF205C910300AC91A1886A5
   CDC903D008ADF1058DF205A9808DF105A560
AY 57 DATA C848A5CC4838A558E91285C8A559E9
   0085CCA81581C8D005A928203D22A9142814
LA 58 DATA 3D22A00181C8D0096868A90085D04C
   261ECDF205D0E788ADF185297FD1C8D0DDE8
KE 59 DATA C8C681C8C908F804C90AD0D1A9208D
   81058D820S2CF10538038D8305A0012033F9
IL 60 DATA 21A908203D22A002202D22A92E2847
   22A9F8203822A007202D226885CC6885C82F
FW 61 DATA A90185CE4CA52081C8F00620542220
   47228810F360C6CC1865C885C89082E6CC4A
HV 62 DATA 608D8005848A00020C82068A86048
   2A2A2A2A2903AA68299F1D63226020400007
IR 63 DATA 6018A55869168DF505A55969008DF6
```

```
   85A9FF8DF705602BA623EEF705AEF705F835
UG 64 DATA 088EF805CAD006ADEE85F80160A212
   A028208023CEF805F011A020207E23A808A0
EH 65 DATA 209223A920203D22D0EAA014207E23
   A808209223A212A81420923A80301C8D831
DG 66 DATA 034C1F23A902203D2230A5C0E9140D
   F305A5CCE9088DF405A212A800208023A2E7
SG 67 DATA 24A028208023202F23208123A02020
   7E2320A623A80220922320123A914203D96
SC 68 DATA 22A224A020209423A212A020200023
   A013898005F003202F23A027A90091500805
RA 69 DATA 10F0A020A91191586DA9888DF90520
   4423ADF905F0016020812320442360ADF7E5
FD 70 DATA 050DF005A000207E23A200A012C0E8
   E00CF01589800SDD0005300DF0F0A212A04C
PW 71 DATA 28209423EEF90560A020209223A9D0
   283022CEF805D0CD60A208A9120DFA058181
Y0 72 DATA C09D0005E8C8CEFA05D0F460A200A9
   120DFA050D000591C0E0C0CEFA05D0F46010
CU 73 DATA ADF5058SC0ADF60585CC60ADF30505
   C0ADF40585CC6048ADF71DC923F014200498
HP 74 DATA 1968A2FF9A05092C410930034C4009
   4C340960A2020E860420E60D2D84194C06F6
DM 75 DATA 1EA903202D28A59840A59148A9079D
   420338ADE502E5900DFD05A0ADE602E5913D
GS 76 DATA 0DFE0520E52598107CC900D0A90D49
   030DFE050D40038DFD05208419A4CEA931D0
AD 77 DATA D9010SD02EA9498DA926A9A9A22620
   0E19A0FF8CFC02CCFC02F0F0ADFC020CFC42
HL 70 DATA 02A228C93ED00CA9FF0DFE02A99D40
   A924D00EA4CEA9319981059018690048A9A3
0X 79 DATA 0540A000A90320D62590309FA59040
   A59140A9809D4203ACFD05ADFE0520E5250F
UT 08 DATA 9030801007A9D8A226208E19208419
   A9000DFE824C061E453AA220ADF01D0D8A40
XR 01 DATA 24A98948A92448A000A90320D62590
   30091DD944313A444F532E535953A5D0D056
8C 82 DATA 0168A200A98048A90548A4CDA93F99
   0005C0A90020D6252004 19A004A91040A958
DH 83 DATA 2548A98320D625A000A91040A92540
   A98720D62505D0A9CFA226200E1920841940
AI 84 DATA A959C5D0D004A9000SD0A4CDA92899
   808560483AADF81D0D9A26A90E05C8A926C5
SJ 85 DATA 05CCA000A20620 0023E6D0A01304CD
   20C324A5D0D017A00D207E23E6D0A00E04EF
XN 86 DATA CD28C324A5D0D005A9FE4C27204C06
   1EA6CDA0FF0CF805A92CC0CAF06FD98005DA
JG 87 DATA D0F7EEF805000889000548A9449980
   0509010548AD0805998105A93A990205E01A
TZ 88 DATA E8E00E4003904820041968401069 00
```

See TYPO II Page 52

```
   400D4483A9006905488D4503A004A9032057
MC 89 DATA D625C0AAF014EEF805A9088D4203A2
   002056E4A9D8A226208E19208419 60A860A8
N0 98 DATA 9901856099005A92C99020SADF805
   609D4283C903D006989D4A031009A9089D22
EE 91 DATA 4903909D4003688DC585600DC40560
   9D4503609D4483ADC40540ADC505484C560C
ZL 92 DATA E4A4CE20EF20A210A9008D9E1518A9
   0165CE9D4403A90569009D4503A4CD097E00
PD 93 DATA 05C92FD00EC6CDC6CD097F05C94ED0
   03CE9E15A4CDA9989900052 0A415E000D05A
V0 94 DATA 034C061EE003F00620AA194C0C23A9
   E0A226200E1920AA194C061E05C806CCA500
CT 95 DATA C8A6CC200E19A0FF08C001C0F00E28
   F0EEC99000E6C0D002E6CCD0EE2060A93F90
IF 96 DATA A2272061264C061E2044FF
YJ 97 DATA ISK DRIVE 1ARE YDU SURE??INSER
   T DISK2;HIT ANY KEY (S=TD SCREEN)!00
ZM 98 DATA DUT DF RAM! ALREADY EXISTS!0AD
    LDAD FILE!70
RZ 99 DATA 1D1D1D449C
HD 188 DATA ISKID 4.3 by Gernard Dppenhei
   m!Antic 1/05!Type HELP for commands!CA
FA 101 DATA 007D4313
JF 102 DATA DMMANDS:!!          DIR    Dir
   ectory!          DIRn   Dir. Drive n!
          FDRMAT Format disk!          62
EP 103 DATA WDDS   Write DDS.SYS!.X->LI.-
   >LISTD  List to disk!.S->S. ->SAVE   S
   ave to disk!.E->E. ->ENTER  EF1
SF 104 DATA nter to mem.!.L->LD.->LDAD
   Load to mem.!.R->      RUND   Run disk
   file!.K->      LDCK   Lock file!.E8
M0 105 DATA U->UN.->UNLDCK Unlock file!.N
   ->RE.->RENAME Rename file!.D->DEL.>DEL
   ETE Delete file!.8->8L.->8LDAD  8iF4
DD 106 DATA nary load!.M->M. ->MDVE   Mov
   e file!!.R9 runs #9 etc. To use DDS ty
   pe KILL.Reboot to restore DISKID.!24
MW 107 DATA 00E202E3D20D1D47
```

INFO BITS

See Help.

LISTING 2

```
   10 ; LISTING 2
   15 ; INFD0ITS.ASM
   30 ICCDM =   $0342
   40 IC0AL =   $0344
   50 IC0AH =   $0345
   60 IC8LL =   $0348
   70 IC8LH =   $0349
   00 CIDV  =   $E456
   90 PUTREC =  $09
 0100 GETREC = $05
 0110 RDWCUR = $54
 0120 CH  =   $02FC
 013D EDL =   $98
 0140 R0LL =  $0358
 0150 S0UFL = $E0
 0160 S0UFH = $E1
 0170 SBLL =  $E2
 0100 R   =   $E3
 8190 R0UF =  $03FD
 0200      *=  $0600
 0210      PLA
 0220      PLA
 0230      STA S0UFH
```

continued on next page

```
0240      PLA
0250      STA S0UFL
0260      PLA
0270      PLA
0280      STA S0LL
0290 ;
0300 GET  LDX #$10
0310      LDA #GETREC
0320      STA ICCDM,X
0330      LDA #R0UF&$FF
0340      STA IC0AL,X
0350      LDA #R0UF/256
0360      STA IC0AH,X
0361      LDA #131
0363      STA IC0LL,X
0365      LDA #0
0367      STA IC0LH,X
0370      JSR CIDV
0380      0MI END
0390 ;
0400      LDX #0
0420      LDY #0
0450 P1   LDA R0UF,X
0460 P2   CMP (S0UFL),Y
0470      0ED P3
0480      CPY #0
0490      0ED P4
0500      LDY #0
0505      LDX R
0510      JMP P4
0520 P3   INY
0530      CPY S0LL
0540      0CS PRINT
0560 P4   INX
0570      CPX R0LL
0580      0CS GET
0585      CPY #0
0590      0NE P1
0595      STX R
0600      JMP P1
0610 ;
0620 END  RTS
0630 ;
```

```
0000 PRINT LDX #$20
0010      LDA #PUTREC
0020      STA ICCDM,X
0030      LDA #131
0040      STA IC0LL,X
0050      LDA #0
0060      STA IC0LH,X
0070 ;
0080      LDA RDWCUR
0090      CMP #20
0900      0CS PRDMPT
0910 ;
0920      LDA #R0UF+$0A&$FF
0930      STA IC0AL,X
0940      LDA #R0UF+$0A/256
0950      STA IC0AH,X
0970      JSR CIDV
0980      JMP GET
0990 ;
1000 PRDMPT LDA #MESSAGE&$FF
1010      STA IC0AL,X
1020      LDA #MESSAGE/256
1030      STA IC0AH,X
1040      JSR CIDV
1050 WAIT LDA CH
1060      CMP #255
1070      0ED WAIT
1072      LDA #255
1074      STA CH
1080      LDA #CLEAR&$FF
1090      STA IC0AL,X
1100      LDA #CLEAR/256
1110      STA IC0AH,X
1120      LDA #5
1130      STA IC0LL,X
1140      LDA #0
1150      STA IC0LH,X
1160      JSR CIDV
1170      JMP PRINT
2000 ;
2010 MESSAGE .0YTE "[illegible]",EDL
2015 CLEAR  .0YTE "K",EDL
```

TECH TIPS

This routine zeroes-out 256 bytes of RAM starting at decimal address ADDRESS:

```
UA 30 ZER=ADR("hh[illegible]")
HR 40 REM X=USR(ZER,ADDRESS)  Zeroes-out
   256 bytes of RAM.
```

This routine performs a double PEEK at decimal address ADDRESS and ADDRESS+1. It's equivalent to: X=PEEK (ADDRESS)+ PEEK(ADDRESS+1)*256

```
RA 50 D0PK=ADR("hh[illegible]")
HT 60 REM X=USR(D0PK,ADDRESS).  Does a do
   uble PEEK at address and address+1.
```

Move NUM bytes from decimal address FROM to address TOO with this handy routine:

```
PY 70 SHIFT=ADR("hh[illegible]")
CJ 80 REM X=USR(SHIFT,FRDM,TDD,NUM)  Move
   s NUM bytes from memory location FRDM
CD 90 REM to location TDD.
```

POKE 580,1 causes a coldstart when the [RESET] key is pressed. POKE 580,255 returns the [RESET] key to its normal state.

This is a timer routine that will make the computer wait JIFF jiffies:

```
PC 100 JIFF=ADR("hh[illegible]")
IL 110 REM X=USR(JIFF,JIFFIES)  Waits JIF
   FIES
```

This statement quickly fills a string with blanks:

```
WP 120 DIM N$(100)
GK 130 N$(1)=" ":N$(100)=N$:N$(2)=N$
VS 140 REM Quickly fills a string with bl
   anks.
```

NOTE: USR routines are REMmed to guide against potential lock-up. Remove REMs before RUNning.

POKE 65,0 shuts off the beeping you hear during cassette and disk I/O. POKE 65,3 turns it back on again.

POKE 77,129 immediately starts the attract mode.

Send your output to the printer instead of the screen with POKE 838,166:POKE 839,238. Then POKE 838, 163:POKE 839,246 sends your output back to the screen.

NEW BOOKS FOR ATARI

Roundup of the Latest Releases

by THE ANTIC STAFF

Mastering Your ATARI Through Eight BASIC Projects, edited by Tom Marshall, comes with a disk containing the 13 programs discussed in the book. These programs range from games and music generators to timers and micro-calculators. Every chapter uses one or two of these programs to demonstrate important programming concepts.Unfortunately in many instances, the editor refers to tables and illustrations which do not exist, and asks you to recall facts from chapters appearing much later in the book.

$19.95. 174 pages. Prentice-Hall, Inc., 200 Old Tappan, Old Tappan, NJ 07675, (201) 767-5000.

Basic ATARI BASIC, by James S. Coan and Rishard Kushner, takes you from an introduction to the PRINT statement to an analysis of Player-Missile Graphics. Beginning programmers should regard this book as a reference tool, rather than a tutorial. It is not easy reading, but the ideas and concepts presented are excellent. The "Bugs in Atari BASIC," section outlines many ways to overcome the language's limitations. Another section examines the special features of the XL Computers, such as enabling fine scrolling through a single POKE statement.

$15.95. 324 pages. Hayden Book Company, 50 Essex Street, Rochelle Park, NJ 07662, (800) 631-0856.

Carl M. Evans's **ATARI BASIC—Faster and Better** shows you how to improve your BASIC programs with machine-language subroutines. The book contains listings and descriptions of more than 80 subroutines, including routines which can make your program unlistable, analyze your program's variables, generate AUTORUN.SYS files and create scrolling screen displays. You don't need to know any machine language to use this book; Evans has translated each assembly listing into DATA statements to use in your BASIC programs.

$16.95. 300 pages. IJG, Inc. From Antic, 524 Second Street, San Francisco, CA 94107, (415) 957-0886.

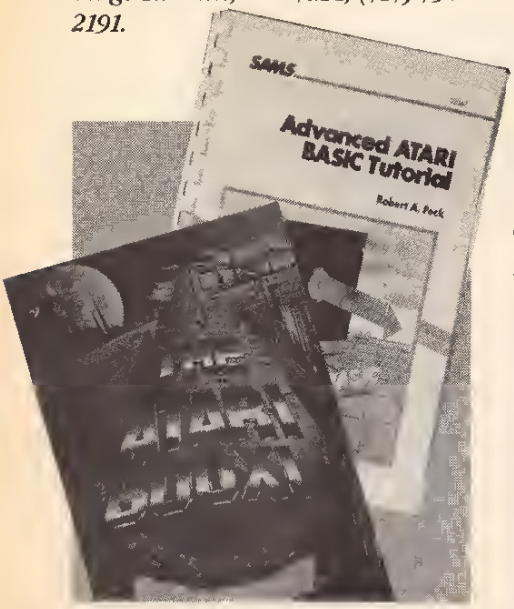
Advanced Programming Techniques for your Atari Including Graphics & Voice Programs, by Linda M. Schreiber, will help you master scrolling, page-flipping, and several other important programming techniques. The book's most helpful chapter, "Working with the Display List," shows you how to create and manipulate customized graphics. The book is easy to read and contains more than 50 type-in programs, including a character set editor.

$14.50. 207 pages. TAB Books Inc., Monterey Avenue, P.O Box 40, Blue Ridge Summit, PA 17214, (717) 794-2191.

continued on next page

101 Programming Surprises & Tricks for your ATARI Computer, by David L. Heiserman, should provide about 30 minutes of pointless entertainment and frustration for a bored eight-year-old.The book is a disappointing collection of 101 "mystery" programs. You type them in and see what they do. There are calendars, quizzes, mock weather predictions, games. Only some games are programmed to cheat,and there are other "practical joke" programs scattered throughout the book.

$11.50. 196 pages. TAB Books Inc., Monterey Avenue, P.O. Box 40, Blue Ridge Summit, PA 17214, (717) 794-2191.



Robert A. Peck's **Advanced Atari BASIC Tutorial**, is a solid sequel to the **ATARI BASIC Tutorial**. It offers clear and comprehensive descriptions of advanced programming techniques such as string manipulation, disk operations and sorting techniques. Featured is a screen builder program to help you create and save your own graphics screens.

$11.95. 174 pages. Howard W. Sams & Co., Inc., 300 West 62nd Street, P.O. Box 7092, Indianapolis, IN 46206, (317) 298-5400.

How to Get the Most Out of CompuServe, by Charles Bower and Davia Peyton. If you got a CompuServe Starter Kit as a present, or if you're just thinking about maybe becoming a subscriber to this telecommunications information service, get this book. It presents a series of "guided tours" through CompuServe's many layers of menus and commands. The tutorial will save you from wasting considerable time and money as you get familiar with moving around Compuserve.

$14.95. 275 pages. Bantam Books, 666 Fifth Avenue, New York, NY 10103.(212) 765-6500.

The Coming Computer Industry Shakeout: Winners, Losers & Survivors, by Stephen McClennan. The author is a leading computer stock analyst whose purpose here was to counsel on which high-tech companies to buy shares in and which to avoid. But the book also gives a startlingly frank, no-holds-barred critique of the good points and bad points of just about every important computer-related company. You'll get a kick out of this if you're interested in the computer industry as a whole.

$19.95. 349 pages. Wiley & Sons, 605 Third Avenue, New York, NY 10158. (212) 850-6500.

BASIC on the Atari Computer for Kids, by Keith and Cherie Wyner, will give you a clear, simple and thorough introduction to BASIC programming. The text and examples are written at a fifth-grade level, but adults willing to study a "kiddie" textbook can expect to learn a good amount of BASIC in very little time.

$12.95. 213 pages. Howard W. Sams & Co., Inc., 4300 West 62nd Street, P.O. Box 7092, Indianapolis, IN, 46206, (317) 298-5400.

Getting Started with Your ATARI 600XL and **The Atari 600XL Program Book**, by Peter Goode, will help you get the most out of your XL. The Program Book is filled with well-documented type-in games, music programs, and Biorhythm graphings. Just remember that these books were originally published in Great Britain, so the listings substitute the "Pound" sign for our number sign (#).

12.95 each. 150 pages. David & Charles, Inc., Box 57, North Pomfret, VT 05053. (802) 457-1911

Kids And The Atari by Edward Carlson is an excellent choice for adult beginners too, despite its title. Chock-full of brief BASIC samples and clever illustrations, the book is spiral bound for easier program typing. The writing is clear and conversational as it covers the fundamentals of BASIC.

$19.95. 219 pages. Datamost. From Antic, 524 Second Street, San Francisco, CA 94107. (415) 957-0886.

The Musical Atari by Hal Glicksman simultaneously teaches you music and BASIC programming for the Atari's four voices. The book features 29 songs arranged for piano and Atari duets, plus a line-up of sound effects routines. Includes programs for turning the Atari keyboard into a piano or chord organ.

$14.95. 167 pages. Datamost. From Antic, 524 Second Street, San Francisco, CA 94107. (415) 957-0886.

LINDA TAPSCOTT

RESTON'S CREATIVE PASTIMES

The best way for most people to learn BASIC is by typing in short programs and experimenting with them. If the programs are accompanied by text that explains them and gives suggestions for alterations, so much the better.

Enter Creative Pastimes, a new series of $6.95 spiral-bound books for beginners from Reston Publishing.

Homework Helper, at 149 pages the largest of the series, presents programs for memory skills, spelling and word problems, and history. The "Computer As A Tool" section gives

you programs for using your Atari as a calculator, to paint, plot bar graphs, sort lists, and to learn number systems.

The programs are presented in fully-explained modules, with instructions on how to combine modules for a larger, more powerful program. The book appears to be a translation for the Atari from a version written for some other computer. So it includes a few commands which simply don't work.

The Code Breakers (subtitled An Atari Adventure) contains a book-length narrative. Nikki and Adam are a teenage brother-and-sister detective team on the trail of a mystery. Using their computer, they decode clues with your help.

There are only seven short programs in the 75-page book, and none is well explained. However, as an interactive story-program for youngsters, "The Code Breakers" appears to have good entertainment value.

Once the first thrill of novelty has worn off, **41 1/2 Fun Projects For Your Atari** promises to get you interested in playing with your computer again. There's a wide range of programs here, with a solid emphasis on puzzles. In addition, there are plenty of suggestions for modifying the programs to suit your requirements.

The first section, "Word Play," presents the familiar word-search puzzle, word and sentence-scrambling programs. "IQ Building" consists primarily of memory exercises, including a concentration-type game. "Strategy Puzzles" contains the star program of the book, an ancient Japanese game called Dozo with a skillful computer opponent. This game alone is probably worth the price.

The "Music and Noise" section takes advantage of Atari's flexible music-generation capabilities, including a program for tuning guitars and one for tutoring guitar. Finally, "Computer Utilities" provides programs such as "A Calculator Utility," "Decimal/Hex/Binary Conversion," and believe it or not, "A Computer Dating Service"! An appendix accounts for the title's "1/2," and gives 12 suggestions for modifying the book's programs or creating your own.

Atari Puzzlements is an interesting experiment. It seems to be intended more for the confirmed debugger than for those who are just learning about BASIC. The book is packed full with very short routines, each of which contains an error of some sort. A line may be scrambled or missing, or program lines may be in the wrong order, or there just might be a tiny mistake in one of the lines. The book's idea is to make you aware of the types of mistakes you make as a beginner, so you'll become more adept at tracking down and solving them. The quality is slightly marred by misleading instructions.

Creative Pastimes has a subcategory of books entitled "Itty Bitty Bytes". Intended for children from ages 6–9, the series attempts to capture children's interest with graphics and sound while teaching them about programming.

All books use the simple, straightforward approach of presenting a short program on one page, with a line-by-line explanation of the program (take-apart) on the facing page. In most cases, it will be necessary for parents to help their children type in and use the programs.

Itty Bitty Bytes of Space programs include "Gravity," "Music from Mother Earth," and "Meteors," a simple game. Some **School Days** programs include "Spelling Counts!," "State the States," and the intriguing "Gag Me With a Spoon," which lets you vent your frustration with the school cafeteria. **Matilda, the Computer Cat** contains "Fleas!," "Nine Lives," and "In the Kitty."

As inexpensive introductions to BASIC programming, the Creative Pastimes series succeeds. Most of the books provide good value and should keep young computerists occupied for hours with a minimum of frustration.

$6.95 each. Reston Publishing, 11480 Sunset Hills Road, Reston, VA 22090. (800) 336-0338

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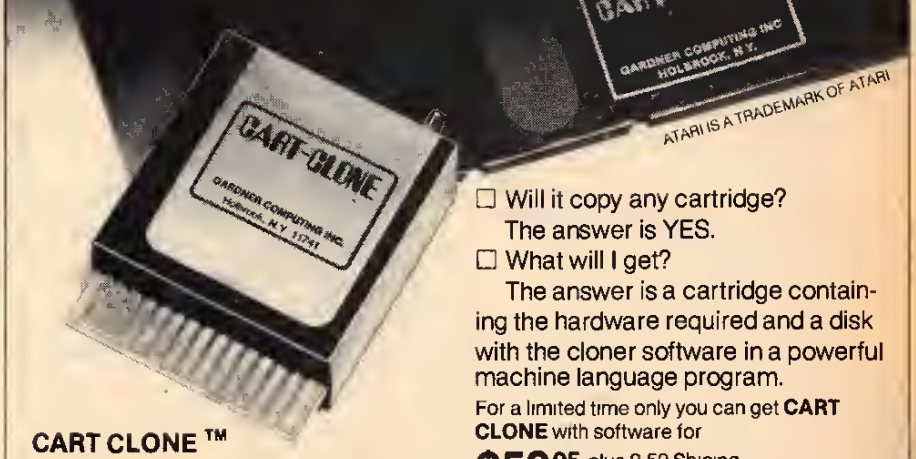

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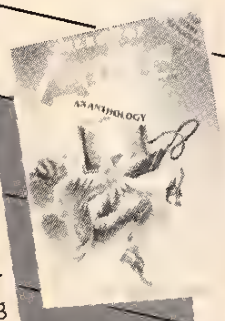

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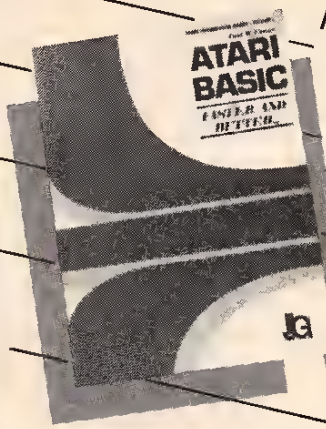

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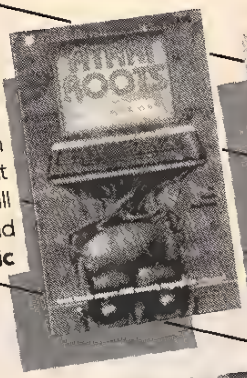

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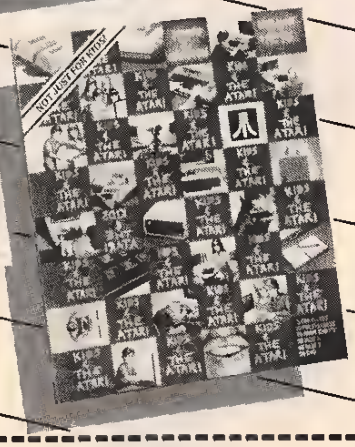

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OP CODE FINDER

Simplifying machine code analysis

by DONNY CHERF

Opcode Finder is a chart that conveniently brings together the symbols for all three formats of representing machine language subroutines in BASIC programs. This information makes it a lot simpler to hand-disassemble short subroutines for study or modification.

Once you understand the fundamentals of assembly language programming, a good way to improve your skills is by analyzing existing programs. You can find machine language subroutines in many of the BASIC programs published in **Antic**. To learn how the machine language is being used in the program, you can disassemble these subroutines (convert them back to assembly language).

This job becomes a little harder because there are three possible formats that can be used for representing machine language data in BASIC programs. These formats are:

Decimal Numbers

— numbers between 0 and 255 represent specific bytes of machine code.

Hexadecimal Numbers

— two characters stand for one byte of machine code.

ATASCII Characters

— the ATASCII numerical value of each character in a string represents a byte of machine code.

I put together the following chart so it would be easier for me to hand-disassemble short subroutines, or modify them slightly, without having to load an assembler into my Atari. The chart lists all opcodes (assembly language operating codes) in numerical order—alongside the corresponding hexadecimal values, ATASCII characters and assembly language formats (Alforms).

Donny Cherf is a computer science major from Merced, California. One of his earlier projects was an Atari version of the Yahtzee game.

continued on next page

Decimal and Hex Codes for Instruction Set
NUMERICAL

DEC	HX	CHAR	opc	ALform
0	00		BRK	
1	01		ORA	(aa,X)
5	05		ORA	aa
6	06		ASL	aa
8	08		PHP	
9	09		ORA	#nn
10	0A		ASL	A
13	0D		ORA	aaaa
14	0E		ASL	aaaa
16	10		BPL	aa
17	11		ORA	(aa),Y
21	15		ORA	aa,X
22	16		ASL	aa,Y
24	18		CLC	
25	19		ORA	aaaa,Y
29	1D		ORA	aaaa,X
30	1E		ASL	aaaa,X
32	20		JSR	aaaa
33	21		AND	(aa,X)
36	24		BIT	aa
37	25		AND	aa
38	26		ROL	aa
40	28		PLP	
41	29		AND	#nn
42	2A		ROL	A
44	2C		BIT	aaaa
45	2D		AND	aaaa
46	2E		ROL	aaaa
48	30		BMI	aa
49	31		AND	(aa),Y
53	35		AND	aa,X
54	36		ROL	aa,X
56	38		SEC	
57	39		AND	aaaa,Y
61	3D		AND	aaaa,X
62	3E		ROL	aaaa,X
64	40		RTI	
65	41		EOR	(aa,X)
69	45		EOR	aa
70	46		LSR	aa
72	48		PHA	
73	49		EOR	#nn
74	4A		LSR	A
76	4C		JMP	aaaa
77	4D		EOR	aaaa
78	4E		LSR	aaaa
80	50		BVC	aa
81	51		EOR	(aa),Y
85	55		EOR	aa,X
86	56		LSR	aa,X
88	58		CLI	

DEC	HX	CHAR	opc	ALform
89	59		EOR	aaaa,Y
93	5D		EOR	aaaa,X
94	5E		LSR	aaaa,X
96	60		RTS	
97	61		ADC	(aa,X)
101	65		ADC	aa
102	66		ROR	aa
104	68		PLA	
105	69		ADC	#nn
106	6A		ROR	A
108	6C		JMP	(aaaa)
109	6D		ADC	aaaa
110	6E		ROR	aaaa
112	70		BVS	aa
113	71		ADC	(aa),Y
117	75		ADC	aa,X
118	76		ROR	aa,X
120	78		SEI	
121	79		ADC	aaaa,Y
125	7D		ADC	aaaa,X
126	7E		ROR	aaaa,X
129	81		STA	(aa,X)
132	84		STY	aa
133	85		STA	aa
134	86		STX	aa
136	88		DEY	
138	8A		TXA	
140	8C		STY	aaaa
141	8D		STA	aaaa
142	8E		STX	aaaa
144	90		BCC	aa
145	91		STA	(aa),Y
148	94		STY	aa,X
149	95		STA	aa,X
150	96		STX	aa,Y
152	98		TYA	
153	99		STA	aaaa,Y
154	9A		TXS	
157	9D		STA	aaaa,X
160	A0		LDY	#nn
161	A1		LDA	(aa,X)
162	A2		LDX	#nn
164	A4		LDY	aa
165	A5		LDA	aa
166	A6		LDX	aa
168	A8		TAY	
169	A9		LDA	#nn
170	AA		TAX	
172	AC		LDY	aaaa
173	AD		LDA	aaaa

DEC	HX	CHAR	opc	ALform
174	AE		LDX	aaaa
176	B0		BCS	aa
177	B1		LDA	(aa),Y
180	B4		LDY	aa,X
181	B5		LDA	aa,X
182	B6		LDX	aa,Y
184	B8		CLV	
185	B9		LDA	aaaa,Y
186	BA		TSX	
188	BC		LDY	aaaa,Y
189	BD		LDA	aaaa,X
190	BE		LDX	aaaa,Y
192	C0		CPY	#nn
193	C1		CMP	(aa,X)
196	C4		CPY	aa
197	C5		CMP	aa
198	C6		DEC	aa
200	C8		INY	
201	C9		CMP	#nn
202	CA		DEX	
204	CC		CPY	aaaa
205	CD		CMP	aaaa
206	CE		DEC	aaaa
208	D0		BNE	aa
209	D1		CMP	(aa),Y
213	D5		CMP	aa,X
214	D6		DEC	aa,X
216	D8		CLD	
217	D9		CMP	aaaa,Y
221	DD		CMP	aaaa,X
222	DE		DEC	aaaa,X
224	E0		CPX	#nn
225	E1		SBC	(aa,X)
228	E4		CPX	aa
229	E5		SBC	aa
230	E6		INC	aa
232	E8		INX	
233	E9		SBC	#nn
234	EA		NOP	
236	EC		CPX	aaaa
237	ED		SBC	aaaa
238	EE		INC	aaaa
240	F0		BEQ	aa
241	F1		SBC	(aa),Y
245	F5		SBC	aa,X
246	F6		INC	aa,X
248	F8		SED	
249	F9		SBC	aaaa,Y
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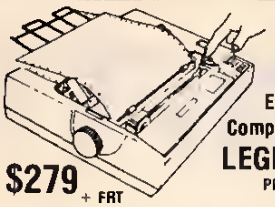

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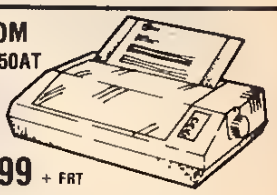

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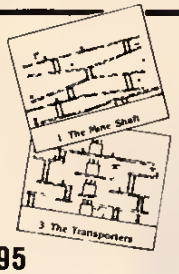

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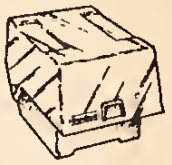

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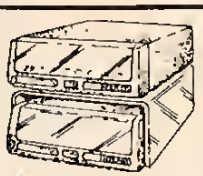

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THE PARALLEL BUS REVEALED
continued from page 47

serious about writing professional-level software or designing any kind of hardware for the Atari computer, this manual is a must. As we go along, I'll briefly explain the concepts you need for these articles, but these explanations are not offered as a substitute for the Tech Reference Notes.

SUMMING UP

So far we've learned: The OS contains a Generic Handler for parallel devices. It selects one of up to eight devices through a hardware register and keeps track of it through a shadow register. The parallel device has a ROM containing low-level driver vectors (and, perhaps, the drivers themselves) and an INIT routine. During coldstart, the OS will run the INIT routine and the device will declare its existence by writing its bit into the Device Mask and putting its name, along with the Generic Handler's address into HATABS. In operation, the device and the OS communicate through the 6502's A, X, and Y registers plus the Page Zero IOCB. The parallel device cannot use OS Floating Point routines because the device's ROM is mapped into those same locations.

Not too hard, huh? Next month we'll look at hardware requirements, and after that, we'll work up an example and look at interrupts. In the meantime, try to resist the urge to tear off that little cover. We'll explain how to do it safely in the next Antic.

Earl Rice held a number of high-level technical positions at Atari, including head of users group support. His last post there was project leader of the projected top-of-the-line 1450XL computer.

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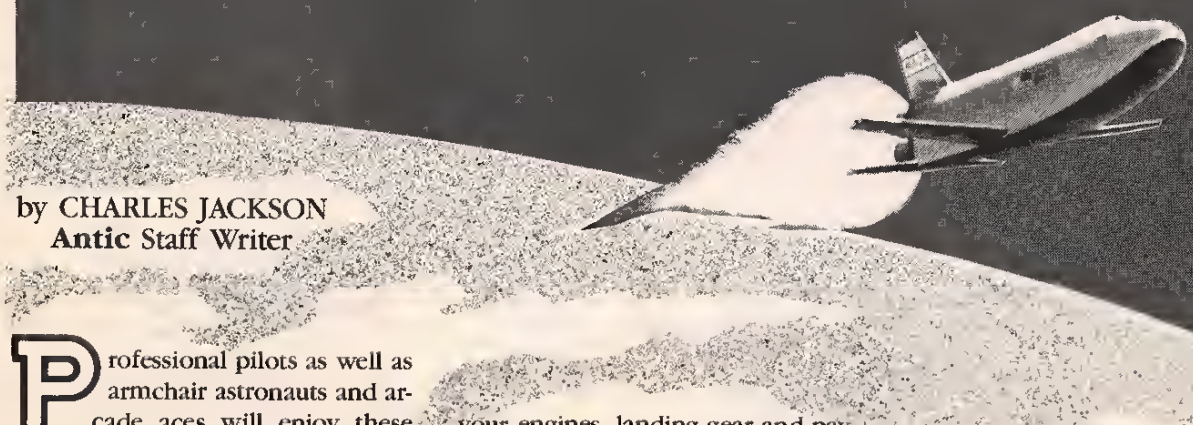
Latest Simulation Software



by CHARLES JACKSON
Antic Staff Writer

Professional pilots as well as armchair astronauts and arcade aces will enjoy these "uplifting" new programs for the Atari. **Flight Simulator II** and **Space Shuttle** plus **F-15 Strike Eagle** all offer more realism than many "professional" flight simulators.

SPACE SHUTTLE

Space Shuttle is a home version of the flight simulator used to train shuttle astronauts. You begin your mission in the cockpit 15 seconds before liftoff. Fire your main engines and watch a blue sky fade to black as you pilot the shuttle into orbit 210 miles above the earth. There, you must rendezvous with a satellite and return to earth before running out of fuel.

Your shuttle is equipped with five radar screens, two sets of retro rockets and a mission status board. Use the board to monitor elapsed time, position, speed, fuel level, plus status of your engines, landing gear and payload bay doors.

Programmers Steve Kitchen and Bob Henderson included many special effects. Just after liftoff, you'll see a flash of light and hear your booster rockets fall away from you. During reentry, while plummeting through the electrically-charged upper atmosphere, some of your instruments will temporarily "black out," just as they do during actual shuttle flights. As you near the runway, you'll hear a pair of sonic booms as you pass through the sound barrier. Upon landing, your main tires squeal as the shuttle rolls to a halt at the end of the runway.

Space Shuttle offers three training modes: an introductory level to give you the "feel" of flying the shuttle, a "training" level to sharpen your piloting skills, and the "Mission" level where you must test your skill against the clock and a diminishing fuel supply. I'd recommend this simulation game for ages 10 and up.

FLIGHT SIMULATOR II

Flight Simulator II is the most advanced flight simulator program available for the Atari. It puts you in the pilot's seat of a true-to-life light airplane, a Piper Cherokee Archer. The program features four-color scenery including mountains, islands, buildings, parks and 80 usable airports. At the start, you're on a runway at Meigs Field near Chicago, facing the Sears building and John Hancock tower. The program also comes with recognizable scenery for Chicago, New York, Seattle and Los Angeles.

Flight Simulator II has an editor that can freeze your position and change any combination of flight conditions, such as altitude, speed, location,

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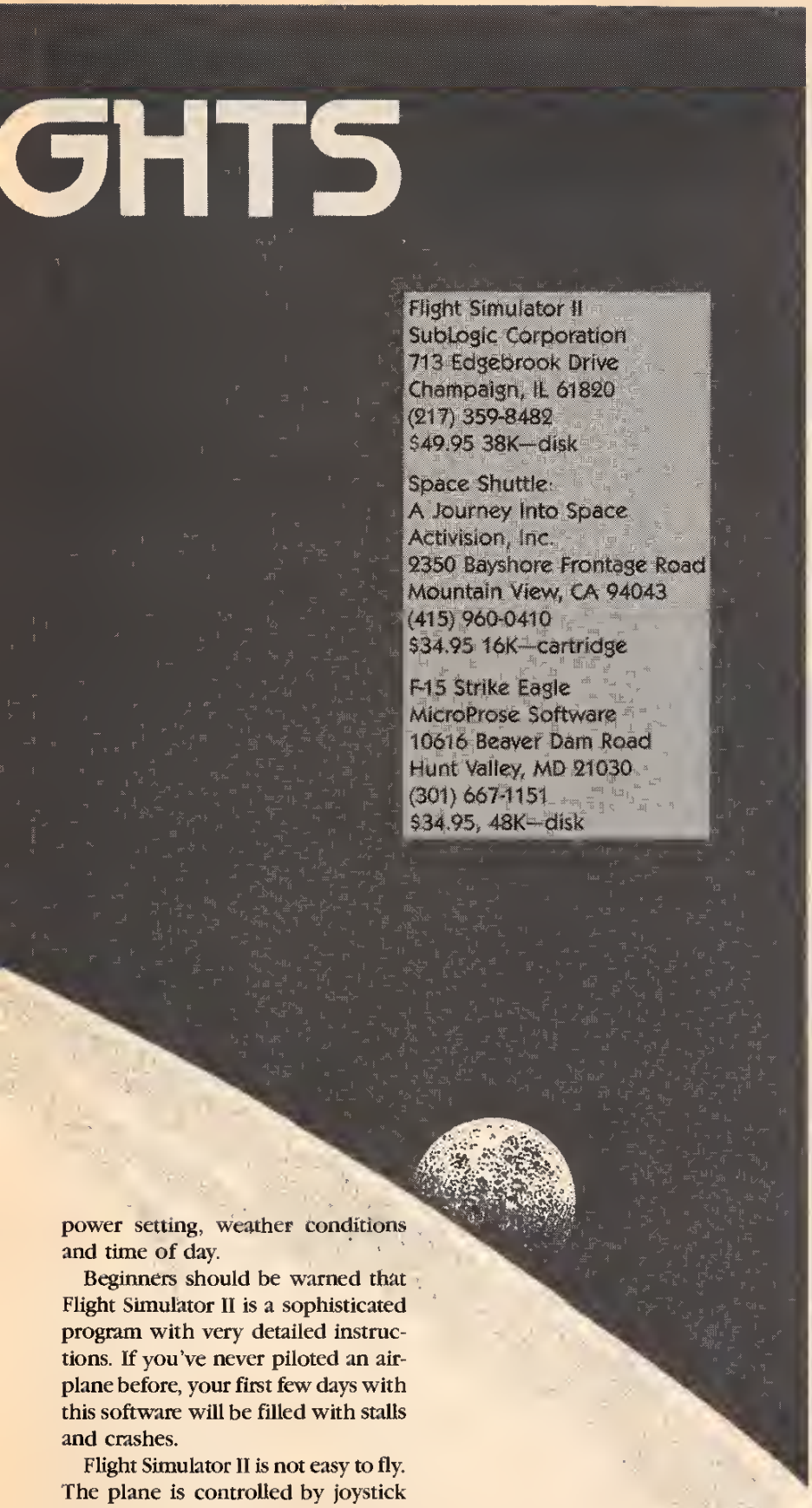

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SubLogic Corporation
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482
$49.95 38K—disk

Space Shuttle:
A Journey Into Space
Activision, Inc.
2350 Bayshore Frontage Road
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F-15 Strike Eagle
MicroProse Software
10616 Beaver Dam Road
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power setting, weather conditions and time of day.

Beginners should be warned that Flight Simulator II is a sophisticated program with very detailed instructions. If you've never piloted an airplane before, your first few days with this software will be filled with stalls and crashes.

Flight Simulator II is not easy to fly. The plane is controlled by joystick plus much of the keyboard. You must press the right cursor arrow key 16 times to advance from idle to full throttle. Press the [5] and [B] keys to look out of the rear window, and repeatedly press the [C] or [M] key to move the rudder.

The program comes with a 92-page book about aeronautics, a 90-page flight manual and pilot's handbook, four flight charts and a double-sided "quick reference" card. Flight Simulator II is not really a game, although it offers a "game" option. The program is actually an excellent training tool which can best be used by student pilots or aviation buffs aged 16 and up.

F-15 STRIKE EAGLE

Launch into the most exciting aerial combat since **Star Raiders** with F-15 Strike Eagle. Microprose Software has realistically computerized seven sky battlezones over the Mid-East and Viet Nam.

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Tbe U.S. Air Force F-15 offers state-of-the-art navigation and weapons systems, including computerized radar and tracking displays, radar jammers, electronic early-warning systems, automatic steering cues, eight supersonic guided missiles, 18 bombs and a 20mm cannon with 1,000 rounds of ammunition.

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The game is controlled by keyboard and joystick. A second joystick may be added to control your throttle and speedbrakes.

F-15 Strike Eagle is an engrossing game which challenges pilots of all skill levels. Beginners will enjoy flying the F-15. Jet aces will enjoy mastering it.

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The RECORDING STUDIO is simple to use. Select a track, choose an instrument then start to play Your Atari acts as your recording engineer.

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- Fill a track

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ROME AND THE BARBARIANS NAPOLEON AT WATERLOO

KRENtek Software
P.O. Box 3372
Kansas City, KS 66103
(913) 362-9267
$34.95 each, 32K—disk or cassette

Reviewed by Michael Ciraolo

In 476 A.D., the Roman Empire collapsed. Historians argue about the causes—internal bureaucratic problems, poor assimilation of conquered people, failure to withstand the barbarian hordes, etc. Now a game combines these factors with the number-crunching ability of the microcomputer and the Atari's graphics.

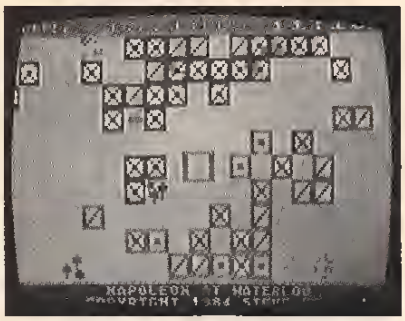
Rome and the Barbarians looks like a standard military simulation/strategy board game with smooth scrolling and joystick control of the cursor. However, it is not that simple.

The screen shows the location of Roman units, rebel Romans, invading barbarians, allied barbarians, mercenaries and locals. This game's excellence comes from its realistic understanding of historical issues. The instruction manual warns that "Although Rome and the Barbarians is a military simulation, the strategy must be based on economics."

The economics involved are complex, but not overwhelming. You must consider city tax values, troop payment, your treasury, hiring barbarians, collecting taxes, barbarian tribe loyalty and so on.

Use the joystick to move the large, square cursor over a map of Europe. The map's graphics have nice touches, such as the snow-capped mountains turning brown in the summer. The joystick button determines troop movement. The [SELECT] and [OPTION] keys, pressed when the cursor is over one of the factions,

ROME AND THE BARBARIANS


NAPOLEON AT WATERLOO

cause the computer to display tax values, troop data and treasury information.

Documentation is excellent. It includes tips, insight into the game from designer Steve Krenek, historical observations, a map, and tax charts.

The amount of information that must be absorbed to play the game successfully is significant. This adds staying power to the game, but makes it difficult to simply boot up and play. The example and beginner games help.

Combat is attended by the sound of clanking swords. Because of the general lack of sound, this is abrupt and surprising.

Napoleon at Waterloo is a more basic version of Rome and the Barbarians. It is concerned with the military strategy involved in deploying forces and fighting. You play against the computer, using the same joystick and smooth scrolling from Krenek's other game. Simpler, shorter, and easier to play, Napoleon resembles the study an artist produces prior to painting a masterpiece. It's a good warm-up to Rome.

EPIDEMIC

Strategic Simulations, Inc.
883 Stierlin Road, Building A–200
Mountain View, CA 94043
(800) 227-1617, ext. 335 outside CA
(800) 772-3545, ext. 335 in CA
$34.95, 48K—disk

Reviewed by Jordan Powell

Are you up for saving the world from a deadly infection from outer space? **Epidemic**, a new simulation game from SSI, allows you just this opportunity.

Meteorites bearing killer alien microbes are headed towards Earth. Your primary defensive weapons are missiles with nuclear warheads for destroying meteorites still in space. You can't hit all of them, though. And once a meteorite hits, the microbes multiply and spread, starting an epidemic. You combat this epidemic with an array of biological and other weapons. As a last resort, you can detonate nuclear devices to destroy entire areas, stopping the disease at the cost of millions of human lives. The goal is to neutralize the disease and stop the spread of epidemics with the least amount of casualties.

As in any good strategy game, you must juggle many variables and interrelated factors. Since you can only accomplish a certain amount in 24 hours, you must allocate your resources wisely. Should you attempt to destroy a meteorite, and if so, which one? Which area of the planet should receive which remedy? You must also deal with uncontrollable meteor impacts and the spread of a disease across geographical boundaries.

A wealth of information is displayed in various forms each turn, but you must know how to interpret it to make the right decisions. Some of the displays take a long time to develop, but they enhance the game by taking advantage of Atari's graphics. For instance, a map of the globe depicts all

continued on next page

areas' current status with various colors and textures. The documentation is a little weak in its description of the displayed data, so you may have to read it a few times and play two or three practice games to understand everything.

A full game can take as long as an hour, but unfortunately, there's no way to save a game in progress. I found Epidemic frustrating to play initially, but as my ability increased the game became much more interesting. If you like games that require thought and the juggling of multiple factors to solve a problem, you'll enjoy Epidemic.

STAR WARS

Parker Bros.
50 Durham Road
Beverly, MA 01915
(617) 927-7600
$44, 12K-cartridge

Reviewed by George Adamson

Star Wars: The Arcade Game (Parker Brothers) brings little to the Atari world beyond the appeal of the title. In this adaptation of the movie plot you fly a fighter, firing at other fighters before attempting to destroy the Death Star.

Moving the joystick moves a gunsight; stationary cannons in each corner of the screen fire toward the sight. The poor 3-D effect would have been better if the cannons moved with the sight instead of remaining still.

The appearance of the Death Star is disappointing. It doesn't enlarge to give the illusion of approach. Instead, the screen switches without warning to converging lines representing the trench on the Death Star. There is little impression of movement through the trench.

Star Wars features a standard status line with points, level and remaining shields at the top of the screen. Despite bearing the name of a bestselling movie, this game quickly becomes monotonous and adds nothing to the state-of-the art.

BRUCE LEE

Datasoft
19808 Nordhoff Place
Chatsworth, CA 91311
(213) 701-5161
$34.95, 32K—disk and cassette

Reviewed by Harris Shiffman

Somewhere beneath Earth's surface lies the vast domain of an evil wizard. Within this realm lie treasures beyond imagining, protected by perils too great to number. The wizard has guarded his underground fortress well, and it will take all the skill and cunning of the greatest of all martial artists to prevail.

Welcome to the world of **Bruce Lee**, Datasoft's latest entry into the arcade adventure genre. As Lee, you explore the wizard's underground lair in hopes of finding his treasure. Passage from one chamber to the next is achieved by touching the right combination of lanterns that appear throughout the maze. Your only defenses against the dangers of the caverns are your hands, your feet, and years of athletic training.

There are numerous traps located throughout the many chambers. You'll also need to deal with the wizard's private army, a series of black-robed Ninja warriors and a large green fighter called Green Yamo. Although a few well-placed kicks dispatch these fellows, they're soon replaced. Fortunately, you are a good deal harder to kill than they are.

As an arcade-type adventure game, Bruce Lee represents a middle ground. It isn't as demanding of reflexes and endurance as Shamus and Shamus II, but is more difficult than the elementary Pharoah's Curse (all from Synapse). The background graphics and animation, while not particularly original or innovative, are clean and attractive, and player response to joystick movement is very good.

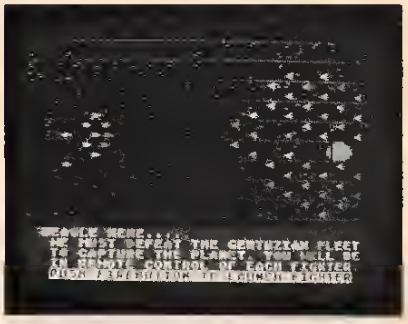
There's one relatively minor flaw. Upon loading the game, a 40-second-long introduction displays Bruce Lee's likeness accompanied by pleasant mood music. It's impossible to cut this short and get on with the game.

Bruce Lee is interesting, challenging, and fun to play. While it could stand an injection of excitement, it is a worthy addition to the adventure maze gamer's collection.

QUEST OF THE SPACE BEAGLE

Avalon Hill Game Company
4517 Harford Road
Baltimore, MD 21214
(301) 254-9200
$35, 48K-disk-requires BASIC

Reviewed by Michael Ciraolo



Like its predecessor, **Jupiter Mission 1999, The Quest of the Space Beagle** combines a variety of arcade games under a uniting theme—your quest to survive, locate the earth and return home.

There are three parts. In the first, your ineffectual robot fighters battle a space armada as you attempt to capture a planet. Then you try to survive in a maze as your air and water repeatedly dwindle. Finally, your patience and memory skills are tested as you search for Earth among all the stars in the known universe. You can't get from one level to another without

completing the first level, although you can save games.

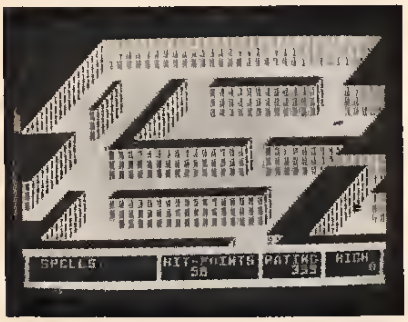
The graphics are fine, but are accompanied by a powerful 60-cycle flickering which is initially distracting and later headache producing.

The second major flaw: there is little incentive to get to the next level, so the game gets boring quickly. You do the same thing again and again. The only reward comes at the end of the game, when you find your way back to Earth. You'll need the attention span of Yoda to succeed.

REALM OF IMPOSSIBILITY

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171
$35, 48K-disk

Reviewed by Jack Powell



A few years ago, a guy named Mike Edwards started to write a football game Somewhere along the line, the defensive team turned into zombies, spiders and snakes The playfield twisted and mutated, and the whole thing became a nightmare. Mike called the game **"Zombies"** and a small software company named BRAM, Inc. put it on the market.

The original Zombies had seven dungeons and a total of 74 rooms, with some of the most stylish graphics seen on the Atari. Along came Electronic Arts, the software marketing marvels. They liked Zombies a lot. So, they went to tiny BRAM, Inc. and **Realm of Impossibility** was born.

Realm of Impossibility is Zombies, but changes have been made. Some good. Some bad. The best part of Zombies had always been the incredible dungeon called "The Realm of Impossibility", which was fashioned after the intricate optical illusions of illustrator M.C Escher. Electronic Arts sent Mike Edwards back to his computer to design more of these goodies. The result is six new dungeons and 55 additional rooms for a grand total of 129 rooms filled with snakes, spiders and zombies—plus some unusual beasties called "orbs", which bear a striking resemblance to Oreo cookies.

Some things haven't changed. You're still a tiny, frantic creature, jerking and waving in animated panic. The game has what is referred to as a "two player cooperative mode". This means that two of you can explore these mazes, but you must cooperate and help each other because both of you must leave each room together. If your partner dies, you can resurrect him.

In the old game, you searched each dungeon for one of the seven stolen crowns. In Realm of Impossibility, some of the rooms are locked and can't be entered until you find the keys hidden in the other rooms. This adds somewhat to the texture of the game play. There are also four levels of difficulty which I found to be a vast improvement over the original, which was so hard that I yanked the disk out of the drive and gave up in frustration.

Unlike most computer games, you have no weapons here. You can't kill anyone. Instead, you drop little crosses behind you which temporarily block the pursuers. You also collect spells which, when cast, confuse or freeze all opponents for a brief period. The method of casting a spell, however, is ridiculously awkward. First, you've got to stop moving the joystick. When you've got every monster in the world racing after you, the last thing you want to do is stop. Fortunately, you can simply hit the space bar to cast a spell.

After a while it all becomes the same. It's still too frantic and speedy and little strategy or skill is required. The rooms are marvelous and inventive but they're really nothing more than decorative pathways filled with the same tiny relentless creatures.

RAILS WEST

Strategic Simulations, Inc.
883 Stierling Road, Building A-200
Mountain View, CA 94043
(415) 964-1353
$39.95, 48K-disk

Reviewed by Christine Lunardini

From unexplored, unsettled wilderness to thriving, industrialized civilization in 60 years, this country changed as railroads laced the continent during the 19th century. It was a time of phenomenal growth where personal fortunes were made and lost as entrepreneurs competed to build industrial empires.

Rails West, (SSI), is one of the best economic simulations ever presented. Written by historian Martin Campion, Rails West reflects a substantial knowledge of 19th century railroad building. The game allows one to eight players to compete against each other or the computer to build a transcontinental railroad connecting midwest terminals to the west coast. You also compete to build the largest personal fortune.

Rails West is not for the faint of heart. It requires an understanding of free market economics and will challenge your skill as an entrepreneur. To succeed, you must figure out the relationship between issuing stock on the open market, floating bonds, and servicing your debts—while managing to

continued on next page

keep enough of your corporation's stocks to prevent interlopers from gaining control of your road.

You can start the game in 1870, when there was only the skeleton of a rail network, or in 1890 when the roads were in place but ripe for takeover. The novice should gain experience playing the 1870 version first.

Rails West is both an educational simulation and a game of skill. Economic conditions fluctuate from year to year, and there is risk as you move from boom times through fair times to depression. The skill is in knowing when you can safely carry a large debt to capitalize your fledgling road, and when to play your cards closer to the vest with the intention of capitalizing on someone else's misfortune. You need not know about railroads or history to play Rails West, but there is a bonus for those who know something of the times.

Rails West is well worth the effort it takes to learn the rudiments of play. It will make an excellent classroom aid, particularly for group participation, and it is a challenging excursion into the land of robber barons for the individual player.

ADVENTURES WITH THE ATARI

by Jack Hardy
Reston Publishing
11480 Sunset Hills Rd.
Reston, VA 22090
(800) 336-0338
$14.95

Reviewed by Jerry White

If you'd like to start creating your own adventure games, **Adventures With the Atari** is all you need.

This 356-page book includes type-in listings of six different adventure game programs. One text adventure and one graphic adventure are supplied in Atari BASIC, in Microsoft BASIC and in Atari PILOT. These well-written programs are clearly printed for easy reading.

You also get two Atari BASIC programs—The Creator and The Interpreter—that let you design and write your own text adventures by simply filling in data. You can use the program shell to create as many different adventures as you like; as long as each game is stored on a separate disk.

The book also includes adventure maps and flowcharts, as well as a variety of useful programming information. And if you'd rather avoid hours of typing, the author will provide readers with the programs on disk for $12.

My congratulations to Jack Hardy and Reston Publishing on a job well done.

X-BASIC & SCROLL-IT

SUPERware
2028 Kinghouse Road
Silver Springs, MD 20904
(301) 236-4459
$29.95, disk or cassette
requires BASIC

Reviewed by Lawrence Dziegielewski

There appears to be no end of strong new utilities for your Atari. SUPERware has taken some of the trouble out of BASIC programming with two utilities from programmer George Schwenk, **X-BASIC** and **SCROLL-IT**.

X-BASIC extends Atari BASIC by adding several powerful features at an extremely affordable price. The utility adds 30 functions, including string arrays, simplified Player/Missile graphics and sound and memory functions.

X-BASIC is loaded into about 2K of RAM. It is called into action from BASIC through the USR function. Each function is a separate, "pre-programmed" machine language subroutine which the user simply inserts into his own BASIC code. You just use the X-BASIC mnemonic (such as DPEEK for a two-byte PEEK), which is easier to use than the standard convention of doing your own machine language subroutines. Sample programs are included on the disk which demonstrate the power of the utility.

The utility's one major drawback is that extensions must be loaded in every time you want to execute an X-BASIC coded program. One way to avoid this is to save the X-BASIC source with the BASIC source into one load file. But still, this is not as easy nor as convenient as a cartridge.

Schwenk's other utility is SCROLL-IT, a machine language program that allows the user to produce intricate fine screen scrolling without the hassle of extensive programming. A sample program is included with the program to demonstrate the utility's power.

SCROLL-IT is called from your BASIC program. It uses BASIC line

Sample programs demonstrate the power of the utility.

numbers 29000 to 29199, and is initialized with a USR call from within the program. Before calling in SCROLL-IT, the programmer must define certain variables in the USR call. Once defined, the USR call installs SCROLL-IT and executes it as a Vertical Blank Interrupt. If you have other routines that also execute during VBI, they must be defined and intialized before SCROLL-IT in order for the utility to work properly. Once the utility is in place, you need only POKE the various Page 6 locations to use SCROLL-IT's functions.

Both of these come with adequate documentation, but there is room for improvement. They are not as easy to

use as a cartridge-based language, and assume too much skill of a beginning programmer. Once mastered, however, they make powerful tools.

MONTANA READING PROGRAM

PDI
95 East Putnam Avenue
Greenwich, CT 06830.
(203) 661-8799
$24.95, 32K-disk
$19.95, 32K-cassette

Reviewed by Rhonda Holmes

The Montana Reading Program helps improve a child's reading skills. Designed for children from five through eight, the program teaches 220 commonly used words that make up the Dolch list. Successful learning of these words is widely believed to strengthen reading ability

The concept of moving up in levels helped motivate the kids.

Target words are displayed in simple sentences. After a sentence is displayed, the target word flashes for a short time and is then erased. A box is set in place of the word, outlining the word's basic shape and length. The child is asked to type in the missing word. If the first try is correct, 150 points are tallied on the pinball-style scoreboard. If the child makes a mistake, the computer gives the message to try again. If the child doesn't get it by the third try, the computer proceeds to the next sentence.

Twelve children, between four and eight, who helped me review this program found its graphics and sound captivating. The concept of moving up in levels through continued play helped motivate the kids. Beyond its benefit to reading skills, this program also builds computer and typing skills . . . all increasingly important today.

ASSEMBLY LANGUAGE PROGRAMMING FOR ATARI

by Mark Chasin
McGraw-Hill Inc.
1221 Ave. of the Americas
New York, NY 10020
(212) 997-1221
$15.95

Reviewed by Jerry White

Learning assembly language isn't supposed to be easy, but it just got easier to understand with **Assembly Language Programming for the Atari Computer.**

This readable 304-page book takes you from the fundamentals of AL programming to complex examples that fully utilize the Atari's unique architecture. It is the book to read if you want to learn AL or simply AL subroutines.

You'll learn about Atari hardware, assembler software and legally accessing Atari operating system routines. Routines included teach the use of interrupts, I/O, sound and graphics; the source code for these routines is available on disk for $12.95.

CHAOS

Touch Stone Software
3213 South 214th East Avenue
Broken Arrow, OK 74014
(918) 258-0222
$29.95, 48K-disk

Reviewed by Christopher Chabris

CHAOS, the Character Animation Operating System, produces complex animation by combining the concepts of character and Player/Missile graphics.

Like P/M graphics, CHAOS has movable objects and collision registers. However, it also has eight shapes, each composed of four colors and eight-by-eight pixel resolution. Because you're able to use P/M and CHAOS together, you can have up to 16 moving objects on the screen simultaneously.

CHAOS is accomplished through BASIC's PEEK and POKE function. Objects can be moved automatically in four directions at two speeds. The system places an object's coordinates and collision information in registers that your program can read, so your program can activate the motion with a few POKEs and then rest while CHAOS executes the motion every VBI. This is an excellent feature because it frees your program for other processing.

CHAOS consumes nearly 6K of RAM. If you use DOS 2.0, CHAOS, P/M graphics and Atari BASIC, you could have only 23K RAM free. However, CHAOS uses none of the Page 6 memory and is compatible with BASIC XL.

New Atari Customer Service Phone (408) 745-4851

As **Antic** went to press, we discovered that the Atari Corp. once again has a Customer Service phone number. It's (408) 745-4851—no more toll-free 800 service. And unfortunately the line seems to be busy most of the time.

For the Atari Corp's current service policy, see the previous issue of **Antic** (December 1984, page 6).

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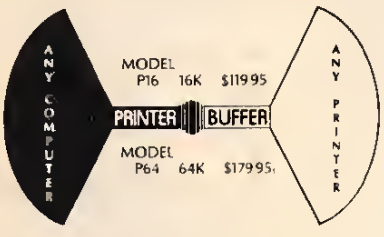

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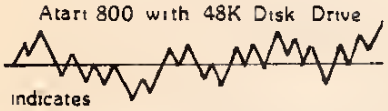

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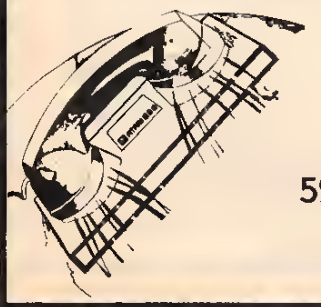

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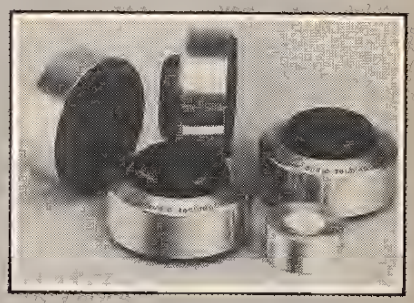

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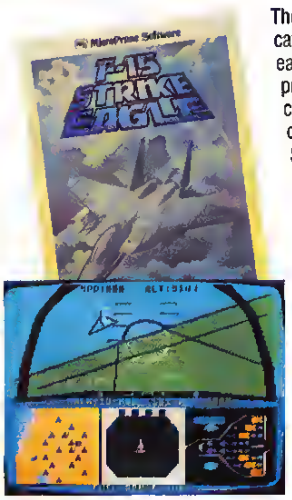

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